COAL AGE

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• **Soon we** will pack up our equipment troubles in the old kit bag and head for Cincinnati and see what's new—and how! Each year the latest and best is on display for close examination and comparisons, while somewhere in the crowds old friends foregather for technical sessions or for talk on the high points of the past year and to peg the future. Come on to Cincinnati ! ! !

• **Not long ago** mechanization of thin seams containing a rock parting was considered taboo — but that time has passed. The Arkansas operation of Binkley Mining Co.'s new Sunshine mine is geared with continuous transportation from faces to preparation plant for an ultimate average 700 tons per day with 140 men in a 36- to 41-in. seam. See p. 37.

• **Is anything more** fascinating than to plan and open a new mine? If there is we don't know about it! In this issue (p. 29) twelve photographs highlight the modern development of the Koppers Coal Co. in West Virginia, and next month Frank Follansbee and H. J. Harper will tell the details of Kopperston from townsite and grass roots to coal face and primary production.

• **The unusual** combination of strip and deep mining in one property is planned and partially in progress at McLaren Coal Co., near Centerville, Ill., where the contours allow stripping of portions of the No. 6 and No. 5 seams before deeper overburden is reached and completely mechanized underground mining is commenced. The stripping story is told in this issue, page 32.

• **Price fixing** has far-reaching effect, not only to the coal producer but also to consumers. What do the proposed new price patterns and their relation to the relative quality of competing coals mean to the industrial buyer? G. B. Gould, who has been technical consultant in the purchase of hundreds of millions of tons of coal, answers these questions in April Coal Age.

• **Roof control** is a live subject—particularly for longwall mining—as is shown in the two papers presented at the meeting of the A.I.M.E. last month (p. 70) by Phil Bucky and R. V. Taborelli at one session, and by John Buch at another. The conclusion of a series of three articles dealing with barodynamic experiments in roof control by Bucky will be published in the next issue of Coal Age.

Carbonization plant control panel: See p. 45.

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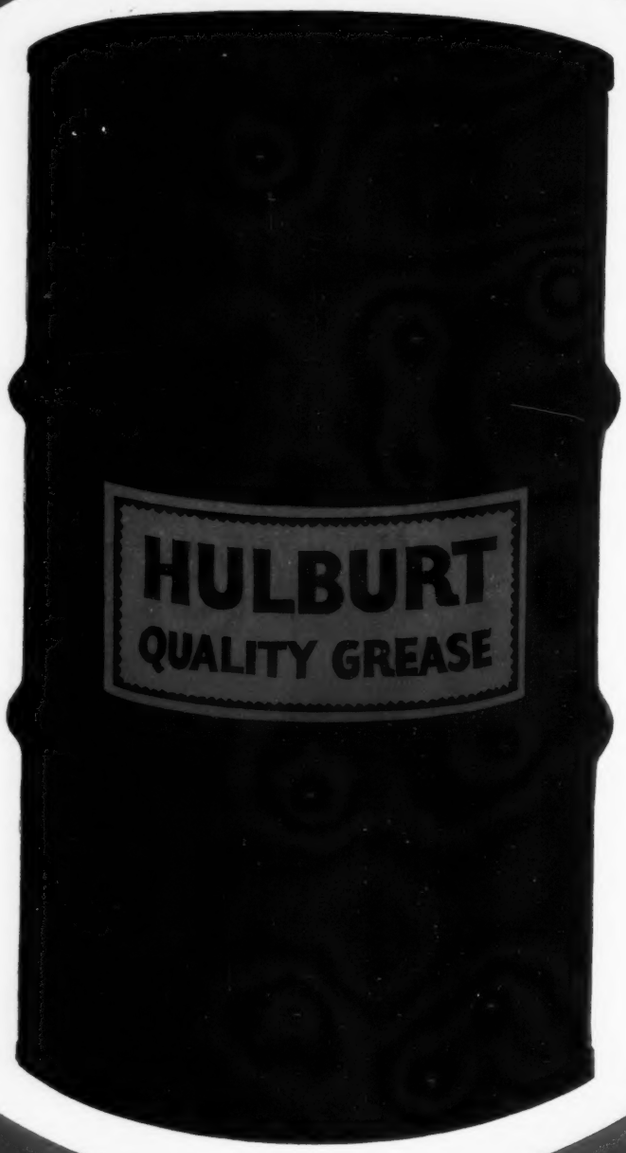

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COAL AGE

Established 1911—McGraw-Hill Publishing Company, Inc.

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

March, 1939

Pertinent and Impertinent

• WHEN GEORGE EARLE was governor of Pennsylvania he was so interested in rehabilitating the anthracite industry he appointed a commission to study the problem. That commission recommended State regulation and State-created marketing corporations. A few days after his inauguration, Governor James announced that he was reversing the fuel-burning practices of his predecessor by changing from oil to anthracite for the executive mansion heating system. Tonnage is sometimes more helpful than talk.

• THE NEED for more technically trained men in the coal industry is frequently cited at meetings of educators and operators. Impressive resolutions are adopted, investigating committees are appointed, and various and sundry attempts to publicize coal's advantages are made. But the fact remains that graduate engineers continue to drift into other branches of mining. Could the low starting pay and the slow rate of salary advance given such men in the coal industry have anything to do with it?

• SECRECY for individual cost returns went out the window Jan. 30 when the Supreme Court refused to enjoin a Coal Commission order authorizing their disclosure. While the particular order involved theoretically makes these returns available only to "interested parties" in the minimum-price hearings, actually the disclosures probably will not stop there. And, after the first shock of exposure, even the operators themselves will find the public knowledge of what it cost to produce a ton of coal will not injure efficient management. Let the timorous take comfort from

the history of the goldfish. Probably the first of that clan to be thrust into the glass bowl quivered with fear under the pitiless light; but its descendants seem to thrive happily out of the dark pools.

• "COMES THE DAWN"—literally—with the commencement of face-lighting experiments. Artificial daylight, now so necessary to the well-being of the office, shop and general industrial worker, may soon be added to the underground benefits of good temperatures and volumes of fresh air now available to the miner. With a reflection factor of only about five per cent, coal faces do present complex lighting problems. But the advantages of underground daylight can be translated into terms of decreased accident hazard and increased output per man. Since these both are valuable contributions to all modernization programs, illumination engineering, if given free rein, can be counted upon to overcome the technical difficulties in the way of better lighting.

• PRESIDENT ROOSEVELT'S recent message to Congress suggesting a national fuel policy embracing all forms of energy will find warm welcome in coal circles. The idea, of course, is not new; it was one of many which fell by the wayside during the formulation of the NRA Bituminous Coal Code. But the tribulations of the last few years have served to impress its importance on the coal industry. Any early statutory enactment of such a policy, however, does not appear likely. In the meantime, coal must work out its own salvation—apparently in the framework of government regulation. This gives further cogency to the growing demand for a reexamination of the legal restrictions under which the industry—and particularly the bituminous branch—now operates.

Pure Research

INDUSTRIAL RESEARCH falls into two broad categories. One group includes projects concerned primarily with a direct attack upon a specific, immediate problem. The stoker and oil investigations made by Battelle Memorial In-

stitute during the existence of the cooperative arrangement with Bituminous Coal Research, Inc., are examples of that type of activity. The second group ranges farther afield and envisions fundamental inquiries into new uses and product applications still largely below the horizon of present practices. This may be termed industrialized pure research with a broad objective but an uncharted path to the goal.

To the extent that they have shown any interest at all in the subject, practical-minded coal men have been inclined to favor the first type of research. They want to see the dollar reluctantly invested in research pay immediate dividends in increased tonnage. This feeling is readily understandable. More research of this character is vital. But the coal industry is overlooking tremendous speculative possibilities if it also fails to invest in the future. Both types of research should have prompt and adequate support by the coal-mining industry.

Washington Manifesto

PRODUCER DEMAND for fundamental changes in the Guffey law is now on an organized basis. This development should surprise nobody familiar with the history of the statute. Workability of some of its major provisions has been questioned from the start. The travails of administration since enactment have done little, if anything, to still those doubts. Dissatisfaction has been steadily mounting. The creation of an operators' committee on amendments last month simply provides a convenient medium for concerted action.

While impatience with "the law's delay" undoubtedly has augmented dissatisfaction, the causes go deeper than that. As the committee points out, there is no assurance either that prices, when promulgated, "will stick" or that "they will materially relieve existing difficulties." To this, proponents of the statute in its present form can make two obvious retorts. First, the committee is condemning the act in advance of a fair trial; second, there is no guarantee that the committee's substitute proposals would be any more effective in meeting the situation.

Here again, oversimplification of the problem easily may be misleading. Protection of wage levels through compulsory maintenance of minimum prices which would support such levels was the primary objective of the original act. But, in attempting to lay down specifications for a perfect price structure, framers and administrators of the legislation have evolved something suspiciously like a straitjacket. How to protect decent living standards without penalizing efficient operations or driving the consumer to other fuels is the basic problem. The Washington manifesto of the operators' committee ought to encourage a fresh appraisal of the factors inherent in a solution of that problem.

Betterment Dangers

EXPERIENCE SHOWS that the roof of entries adjacent to rooms, particularly when their pillars are being drawn, is subject to racking strains. The roof, however, may not fall or even appear dangerous until or unless the headings are scaled, widened, retimbered or pierced with new openings driven from the headings themselves or through or toward them. Hence, care always is needed when work is done on the roof or sides of such headings. Widening for a sidetrack is especially dangerous; even the scaling of ribs to provide passing room alongside mine cars has its perils.

Such changes always should be made by careful, skilled men under close supervision. Notice should be given to the men so engaged that the work is hazardous and that temporary props are needed to prevent rock from falling prematurely during the reconstruction. Most men feel that such work calls for no special precautions, but the record shows that without them fatalities are likely to occur. That widening or heightening an old heading is perhaps more hazardous than driving a new one in solid strata is a warning which cannot be too often impressed upon foremen and their fellow workers.

Which Way?

FOR YEARS, union leaders have taunted bituminous operators on their failure to present a solid front. And labor organizations have waxed strong on the very weakness their spokesmen hold up to scorn. "Divide and rule" is a precept which Mr. Lewis and his cohorts have learned well and practiced effectively. Within a few days, Appalachian region wage negotiations will again be under way. Will this strategy of division once more be allowed to blind both parties in the negotiations to fundamental and critical realities?

The possibility of driving a sectional wedge between the operators is always present. Such a split openly occurred as recently as 1934—with neither the North nor the South gaining anything from the division. A split over mechanization which would traverse sectional lines holds even more deadly potentialities. Proposals to widen differentials between hand-loading and mechanized mines might appeal to some producers, but any advantage so won by the non-mechanized operations would be both temporary and costly. Adoption of such proposals would be a plain invitation to competitive fuels to take more tonnage away from the bituminous industry.

Too often in the past, wage negotiations have degenerated into a contest of wits, strategy and bluff instead of a frank and open discussion of pertinent economic facts. Today the situation is too serious to justify poker playing or horse trading with the destinies of an industry and the hundreds of thousands directly and indirectly dependent upon it for a livelihood. What is needed now is a direct approach to the immediate issues, supplemented in the future by continuing study of changing economic factors.

JOB SECURITY HIGH

+ In Bituminous Mining Industry

For Men Past Half-Century Mark

JOB SECURITY has assumed a new—and sometimes terrifying—significance to the average middle-aged industrial worker since 1929. Chances for the efficient man who has turned the half-century mark remaining on bituminous mine payrolls, however, are better than the average. According to the 1930 Census, men 50 years and older constituted 17.4 per cent of the male population ten years ago. A survey just completed by *Coal Age,* covering approximately 19.54 per cent of the wage earners now employed by the bituminous mines, indicates that 21.14 per cent of the bituminous mine workers of the country are 50 years or older and 2.56 per cent have reached or passed 65 years.

Total Employment Rising

Although broken running time is still the rule for the industry as a whole, total employment figures have been rising. This is due both to the more favorable general business outlook and to the fact that the major liquidation in surplus coal-mine capacity took place in the period between 1923 and 1929. In the first-named year, bituminous-mine employment reached an all-time peak of 705,000 men. By 1929, this figure had shrunk to 503,000. The impact of the depression years further forced the total down to 402,000 men in 1932. Since that low, however, the number has been moving upward. Estimates of the U. S. Bureau of Mines put the 1937 total at 484,000 men—or only 3.78 per cent less than in 1929. Total employment in the manufacturing industries (exclusive of salaried and managerial workers), it is estimated, was 5.71 per cent behind the 1929 figures in 1937.

Excluding agriculture and the domestic- and personal-service groups, the 1930 Census showed that 86.25 per cent of the male workers gainfully occupied were employed in five major divisions of trade and industry. These were: extraction of minerals, manufacturing and mechanical industries, transportation and communication, trade and clerical. Workers 50 years and older accounted for 18.51 per cent of the total gainfully occupied in the extraction of minerals; for the manufacturing and mechanical industries the figure was 21.54 per cent; transportation and communication, 18.19 per cent; trade, 23.09 per cent; clerical, 13.85 per cent.

Since the Census tabulations include salaried workers as well as wage earners, it is probable that the percentages of wage earners in the higher-age brackets are slightly less than the averages for both groups of employees. The *Coal Age* survey was planned to cover only workers on the mine payrolls and, therefore, includes only an insignificant percentage of men in the salaried groups. Figures used in the paragraphs following are based on confidential reports from 169 companies operating over 320 mines. The over-all picture of the survey results is shown in Table I on page 28.

Although the Southern Appalachian and the Southwest regions rank lowest in the percentages of men 50 years and older employed, there is no disposition in those areas, operating officials assert, to put up the bars against the continued employment of men who have passed the half-century mark. "I have in mind several of our men," states one such official, "who have held important positions—such as track foremen, motormen and carpenters—who were active well up in their seventies and doing a good job." Another company with 12.9 per cent of its men in the 50-year and older groups reports that about 5 per cent of the force have had continuous service records of 30 years and more.

Long Service Records

One Southern Appalachian company's records show that 27 per cent of its men have been employed continuously for ten years or more by the company and that a few have been with it from the start of operations. The oldest employee was born in 1868. Another Southern company, employing less than 250 men, has had four of its workers on the payroll for 30 years, six for 25 years, five for 20 years, fourteen for 15 years and nineteen men for 10 years. This company, incidentally, is highly mechanized. At another mechanized operation—this one in the Northern Appalachian region—23.9 per cent of the employees are 50 years or older. A Southwestern mine, employing less than 200 men, has had a number who have been working for the operation 40 years. "The blacksmith," comments the general manager, "is 80 and he is a damned good blacksmith."

Percentages of men over 50 employed by many companies in these two areas are far above the average. In some cases, these percentages range between 22.7 and 36.6; one company reports 44.4 per cent and another 50 per cent of its men have passed the half-century line. "There is no bar to age here," declares the vice-president of one company whose payrolls show that 35 per cent of the men employed are 50

years or more and 15 per cent are 65 years or older. Turning to the Northern Appalachian field, one company employing less than 100 men has 62.9 per cent who are 50 years or older and 41.9 per cent have been with it for 20 years or more; three of the men in this second group have been working for the mine for 50 years or more, eight for 40 to 50 years and nine from 30 to 40 years.

Regional Variations

Higher percentages of older men in the Northern Appalachian, Midwest and Rocky Mountain regions may be attributed to two major causes. During the post-war upsets of the '20s, these areas were harder hit than some of the Southern districts. As a result, opportunities for additional employment in these three regions were diminished and the age mean was less diluted by the infiltration of new and younger men. Union influences with their emphasis on seniority also played a part. These influences, however, have provoked little resentment in these areas, as the great majority of the operators there and elsewhere have been sympathetic to the idea of keeping the faithful worker on the job as long as he was equal to the task imposed. And, as in the anthracite section (see *Coal Age*, January, 1939, p. 36), wherever possible, bituminous operators in all fields have tried to shift older workers to less arduous occupations when advancing years make the earlier job too strenuous.

As indicated in an earlier paragraph, variations in the percentages of older men employed by different companies in the same producing area are frequently quite marked. This also is true when a study of companies based on the total number of employees but without regard to the geographic location is made. For example, in the group of companies reporting total number of employees of 100 or less, the percentages of men over 50 employed runs from 4.0 to 76.0 per cent. Two of the companies in this group employ no men over 50 and eighteen report no employees of 65 or older. In the next size grouping (101 to 200 men) two of the 35 companies had no workers over 65, but all 35 had men over 50 on their payrolls.

Considered as groups, however, the average percentage of older employees (see Table II) reveals no consistent pattern which can be related to the size of the company. What this study does show is that, with the exception of the fifth group (companies employing 401 to 500 men), there is a progressive increase in the average number of employees of 50 and older. This, of course, is not surprising, since, naturally, the larger companies have greater opportunities to employ more men past middle life at tasks in keeping with the physical abilities of such workers.

"It is our policy," writes the president of a company in the fourth group in Table II, "to either advance our older men to supervisory positions when they are capable or find them easier work around the mine. In the hiring of new employees, their competence and experience are more important than their age."

"We have many workers over 50 years of age who are in exceptionally good physical condition," says the head of a company which pioneered mechanization in its particular district, "and as long as men can maintain reasonable physical condition and good health, the age factor doesn't enter into it."

Not so long ago the average age of all employees at another completely mechanized operation was 51 and only a handful was under 30 years. "I think," remarks one operating executive familiar with trends, "that that condition obtains in quite a number of Midwest mines, as, in the change to mechanization, most of the companies try to take care of their older employees and in these fields relatively few young men have gone into mining in recent years."

Effect of Mechanization

Any adverse effect mechanization may have upon the job security of the older workers will be only temporary, in the opinion of an operating executive in the Northern Appalachian field. "In the initial period," he says, "mechanization possibly will tend to disbar the older workers because it entails a training job by men who are not necessarily too well trained themselves, the younger men, who are more active and more adaptable to new ideas in operation, naturally make the best men initially. I do believe, however, that after this mechanical mining has become a little older, men more trained in mechanical mining will take the same position as in the coal mine where pick handling is now the practice."

Changing from hand-loading to a mechanized basis sometimes induces voluntary retirement by older workers who do not care to adapt themselves to newer methods. In one case, such a change-over eliminated several men who were 70 years old. "We do not," states the president of a company employing over 2,000 men, "dismiss any men who are able to work—regardless of age. We have at least one man in active employment 76 years of age. Those who have been in the service of the company 20 years and are unfit for active work we pension; those who have not been in our service 20 years we carry on in some form or another, always, however, paying the union scale."

Caring for men who might otherwise be displaced by mechanization is illustrated in another case history. Although the change-over from hand-loading operations was inaugurated several years ago, the company is still carrying over 33 per cent more men on its rolls than actually needed and these are sharing the work with other employees. In this company, 44.2 per cent of the men are 50 or older and 17.6 per cent are in the 65-year and older group. Average ages of underground workers at its various operations range from 51.7 to 53 years; average for the surface workers ranges from 46.3 to 52.2 years.

Table I—Percentage of Bituminous Mine Workers 50 Years and Older

No. of Companies Reporting	Region	Number of Employees			Percentage of Total	
		Total	Over 50	Over 65	Over 50	Over 65
44	Southern Appalachian	28,948	3,588	348	12.39	1.20
54	Northern Appalachian	39,258	9,195	1,031	23.42	2.62
36	Midwest*	20,502	5,878	911	28.67	4.44
16	Southwest	1,719	282	49	16.17	2.85
19	Rocky Mountain States	4,130	1,053	83	25.49	3.46
169		94,557	19,996	2,422	21.14	2.56

* Includes Iowa and North Dakota.

Table II—Percentage of Workers by Size of Companies

No. of Companies Reporting	Number of Employees	Number of Employees			Percentage of Total	
		Total	Over 50	Over 65	Over 50	Over 65
44	5 to 100	2,266	571	62	25.19	2.73
35	101 to 200	5,019	1,355	214	25.00	4.26
24	201 to 300	5,884	1,100	97	98.69	1.65
19	301 to 400	6,758	1,532	191	22.67	2.82
8	401 to 500	3,682	601	45	16.32	1.22
11	501 to 750	6,547	1,342	138	20.49	2.11
6	751 to 1,000	5,290	1,113	109	21.04	2.06
8	1,001 to 1,500	9,784	2,048	363	20.93	3.71
3	1,500 to 2,000	5,349	1,441	156	26.49	2.91
11	Over 2,000	44,924	9,020	1,059	20.08	2.36

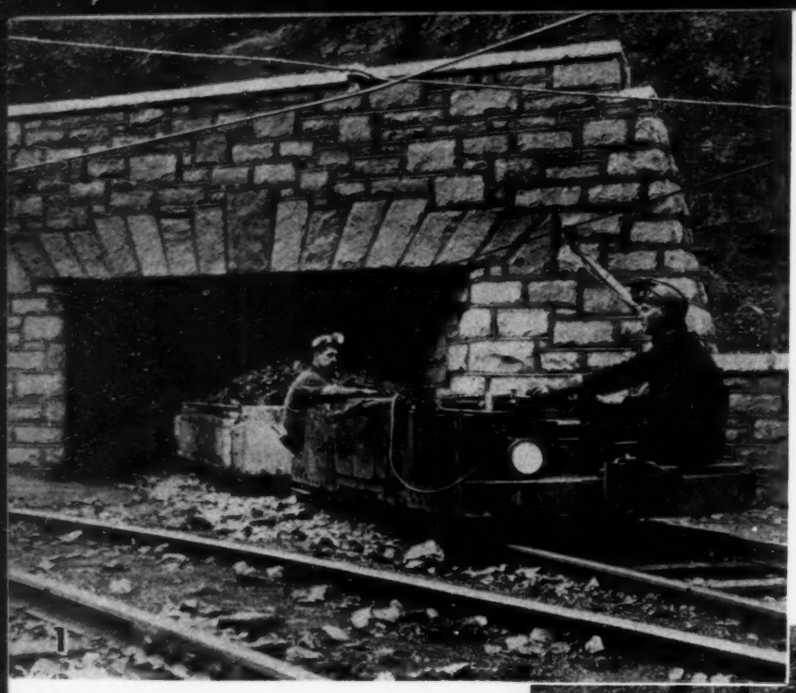
General view of the village of Kopperston, which recently was constructed. The mine is up the valley from where the picture was taken. A community center and company offices will be built on a site to the left of the area shown here.

KOPPERSTON MINE

+ A Pictorial Preview

TWENTIETH CENTURY industry finds its way into a quiet little valley in Wyoming County, West Virginia, where it sets about retrieving the coal hoarded by nature in the surrounding hills so that it may be brought to the service of mankind. The scenes shown on this and the two pages following are from the Tony Fork Valley, where the Koppers Coal Co. has just placed its newest mine in operation in the Eagle seam. From the mine at the head of the valley the development stretches two miles down the valley to where the coal company has erected a new community named Kopperston.

Left—A typical farmstead in the valley, with an old log water-driven grist mill, and other structures of another day, which have been replaced by the new mining plant. Right—Beginning of the new mining operations. Tracks in the center go down the valley to the end of the railroad line, where supplies and equipment are unloaded. Tracks at the left lead to development drift openings in the hill, not shown in the picture. Tracks along the hill at the right lead to more development drift openings, past the main haulageway entrance, and to the tipple, shown in the background at the extreme upper left.



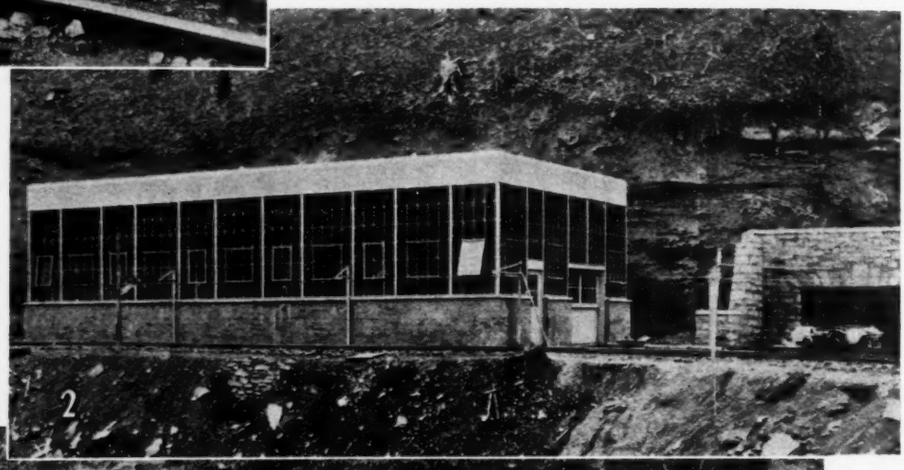
1—A trip emerges from one of several drift openings.

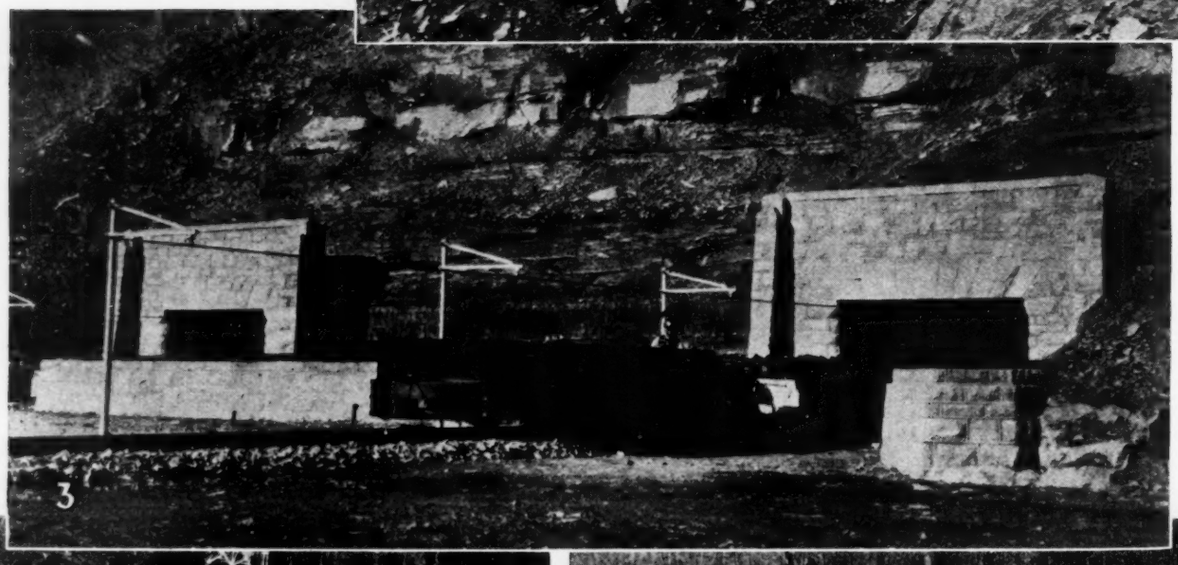
2—Service shop with a drift opening at right.

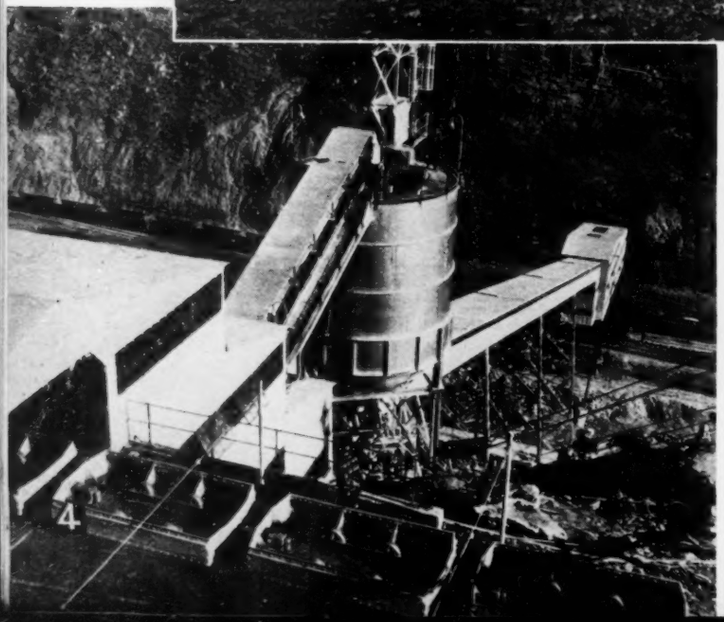
3—Portals of main haulage entries, which will be put in operation as soon as they are mined through the hill to the openings shown at right in lower right-hand picture on p. 29.

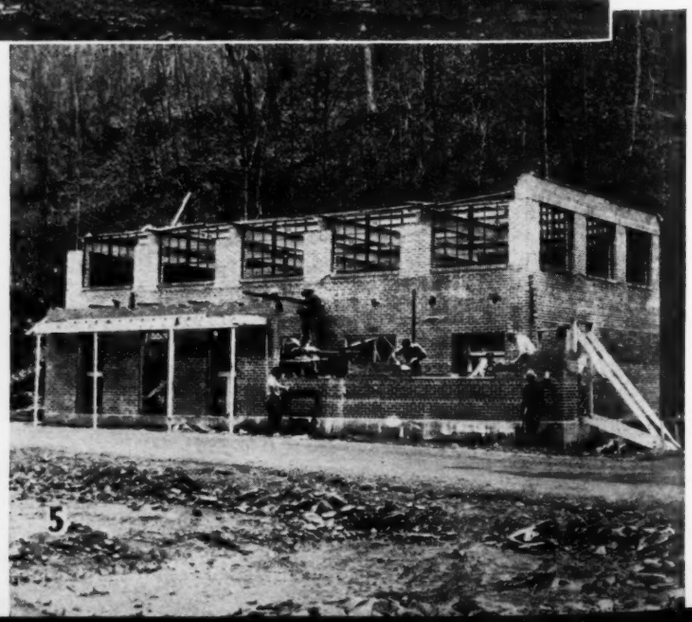
4—Looking down at the tipple and the railroad yards in the valley, the cables leading off right center carry tram buckets for refuse disposal in a valley on the other side of the hill.

5—Miners' washhouse which is nearing completion.









6—Close-up of some of the houses.. They are of four and five rooms with a variety of external architectural treatments and are painted in a number of color combinations. All have bathrooms and thermostatically controlled force-draft coal furnaces.

7—Looking from the living room of one of the houses through the dining room to the kitchen at left, and through a hallway at right to one of the bedrooms. Another bedroom and bathroom lead off this hall.

8—A close-up of one end of a living room.

9—Final touches are being given to the new general merchandise store of the Koppers stores division.

TWO-SEAM RECOVERY

+ By Both Strip and Deep Mining

Set Up by McLaren Coal Co.

NOW in the stripping phase after experimental operation to determine the feasibility of mechanized mining underground, the McLaren Coal Co. contemplates the eventual recovery of both the No. 6 and No. 5 seams on substantial holdings just west of Carterville, Ill., by a combination of strip and deep mining. Following the initial deep-mining operation, stripping activities started with the recovery of a pillar area in the No. 6 seam with a walking dragline. Upon completion of this work, the dragline was moved onto the strippable part of the No. 5 and, working in tandem with a steam shovel, is uncovering this seam at an average rate of 1,000 tons per day, reaching a maximum of 1,350 tons at times. The future deep-mining cycle will be based on complete mechanization with mine-car transportation in the upper, or No. 6, seam, and conveyor transportation in the lower, or No. 5.

The deep-mining opening is a slope at present equipped with a hoist and track for handling mine cars. Track will be continued in service on this slope, now inactive pending resumption of deep mining on a major scale, while the No. 6 acreage is being worked out, upon the completion of which the slope will be extended down to the No. 5, about 35 to 37 ft. below, and a belt conveyor installed to take coal from the conveyor transportation system serving the loading equipment.

The No. 6 coal on the McLaren tract was mined nearly to the outcrop by the old Prosperity Coal Co., which started operations about 1871 and quit in 1906. In this mining cycle, however, about 50 per cent of the coal was left in the form of pillars. Inasmuch as the coal ran 8½ to 12 ft. thick and a substantial pillar area was under light cover, an attractive stripping opportunity existed, provided equipment suitable for working across the open spaces of the rooms or the caved areas resulting from falls could be found. In addition, a substantial acreage of No. 5 also was available for stripping, which naturally was set up as a major operating objective.

The Prosperity holdings—both No. 6 and No. 5, the latter averaging 4 ft. in thickness—were taken over by the McLarens in 1925, at which time mechanical loading was just beginning to get into its stride. Consequently, it was decided to equip with pit-car loaders to test out the claims for mechanization under conditions obtaining on the property, and therefore the No. 6 seam was operated with this equipment until 1929, when it was shut down until 1935, to reopen on a primarily stripping basis with a new tipple. In 1937, however, a Joy 5BU loader was bought and tried out in the No. 6 and now is in storage pending resumption of deep mining. The year 1935 also

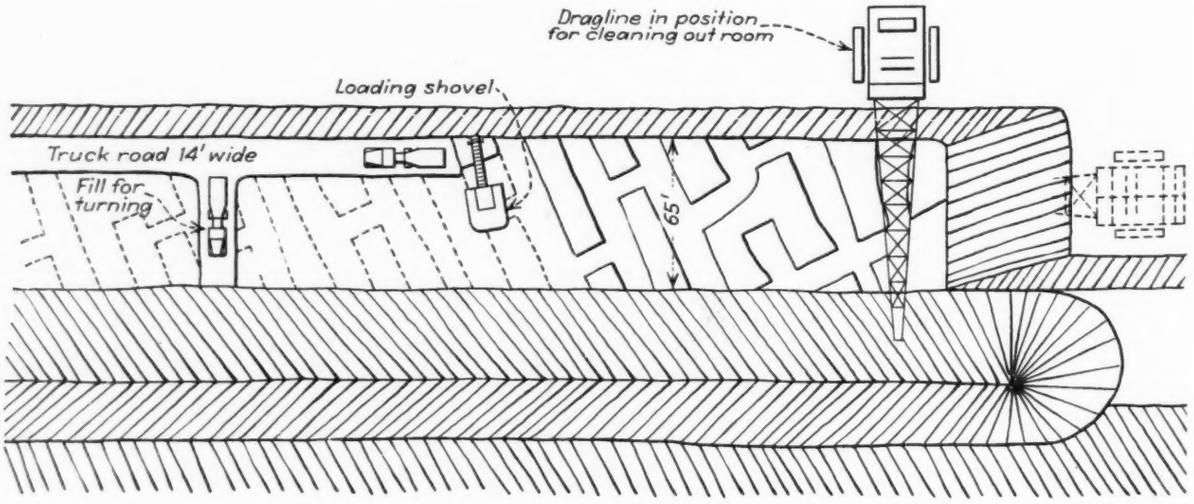


Fig. 1—Although this sketch is not an actual reproduction of a section of mine map, it does show diagrammatically how pillars in the old No. 6 workings were stripped and loaded.

was marked by the acquisition of the Peabody No. 25 (Burr, or No. 6, seam) mine acreage, which is being held for deep mining.

The McLaren Coal Co. is headed by A. B. McLaren, who has spent more than half a century in the coal business in Illinois and was the first stripper in Illinois south of Danville, where modern stripping had its birth. His New Enterprise Coal Co. started operations in 1913 with one of the first of the modern types of shovels—a Marion 250 steamer with a 3-cu.yd. dipper. Mr. McLaren, while head of the Coal Stripping Co., also was the first to introduce tractor-trailer haulage in Illinois in 1934. W. S. McLaren, A. B. McLaren's son, is the operating head of the McLaren Coal Co.

The new tipple, installed in 1935 and designed to handle coal both from the slope and from the tractor-trailer units used for transporting strip coal, was built by the McLaren company, using mainly Link-Belt equipment. Dumping facilities are arranged with the mine-car dump over the trailer dumping station so that the same bin can be used. As now constituted, the tipple is a six-track plant which can ship 26 different combinations. Equipment includes shaker screens, picking tables and loading booms for the four larger sizes (three booms are Link-Belt rescreening units), a crusher for breaking down 2x1¼-in. nut in making stoker coal, a 4x10-ft. "Selectro" vibrating screen for stoker production and the dedusting of screenings, and a "Dustlix" plant for the dustproofing of all sizes. Provision also was made for conveying 3x0-in. coal to a future washing plant if found desirable. Capacity of the tipple is 250 tons per hour.

Pillar Stripping Completed

Stripping of the No. 6 pillars, the only feasible recovery system, was completed in October, 1937. In this two-year period the output from this pillar area was approximately 250,000 tons. Maximum stripping depth was 55 ft., operations starting on the outcrop on the south and going north until that depth was reached, with the stripping cuts running roughly northeast and southwest, as compared with a prevailing north and south direction for the rooms and east and west for the entries. Room and entry width was about 15 ft., but pillars were all sizes. Aside from the usual clay and surface material, the coal was overlain by a gray shale ranging from 6 ft. in thickness at the outcrop to a maximum of 30 ft. in the deeper banks.

Drilling, shooting, loading and hauling No. 5 coal in the McLaren pit. In the right background is the steam stripper, which works in tandem with a walking dragline, in this case farther to the right and therefore out of sight.

Much of the shale was caved into the old rooms, the caving providing good fragmentation, with consequent good digging conditions. As a result, shooting was intermittent and was done only in hard spots, generally where the shale had not caved. Before starting the stripping, the workings were dewatered with a deep-well turbine pump, still in service in the old Burr C shaft.

Because of its characteristic features, the walking dragline was chosen for the No. 6 stripping. A tub diameter of 27½ ft. was considered ample to span practically all the openings over which the machine would have to work, thus making it almost certain that a solid support would be available at all times. Its high degree of mobility was another item—making it possible for the machine to shift position rapidly from regular stripping to cleaning out old rooms. Naturally, stripping from the top of the coal was out of the question. Due to the fact that it had not been mined previously, the McLaren organization planned to use a shovel in uncovering the No. 5, and in this operation the dragline, when it had performed its specialized function of stripping the pillars, also could be used to increase the No. 5 stripping yardage and consequently the production.

The machine finally chosen was a Bucyrus-Monighan 6W diesel electric walker with a 6½-cu.yd. Page automatic rock bucket with manganese arch, lip and wearing corners. Boom length is 135 ft. Cut width was established at 65 ft. and the dragline was started on the solid coal at the outcrop and then was worked north, still taking the normal cut, to 55-ft. overburden. In making a cut over the old works, the dragline, when it had uncovered a room, would move around on the bank and, working parallel to the room, would clean it out as far as possible, discharging the spoil on the regular bank. A diagrammatic sketch of how rooms were cleaned out appears in Fig. 1. Of course, if the opening ran parallel to the pit direction, the rooms were cleaned out along with the regular stripping work. The dragline worked only from west to east, deadheading back after each cut, as that was found, in addition to simplifying transportation, to require less time than digging in and turning around.

Difficulty in determining with the necessary accuracy the condition of the shale at the points the holes were to be drilled, with consequent possibility of loss of explosive through detonation over only a thin layer of slate over a room or in an area of caved top, led to the adoption of an air drill in the early stages of the project—later replaced by a vertical auger. With the air drill, a row of holes was drilled not over 10 ft. deep on the tight side of the cut while the dragline was working on the loose side. Usually, the tight-side holes were all that were necessary, although at times other holes were drilled as required. In each case, of course, a spot was thoroughly cleaned by the dragline.

Following the air drill was a Hardsoeg vertical auger taking 5-ft. auger sections and putting down

McLaren preparation plant and, at the right, the dumping station for both strip and deep-mined coal. Under the headhouse is the chute which conducts deep-mined coal to the same bin in which strip coal is dumped.

holes as deep as 15 ft. This drill, with one 5-ft. auger length, now is used in drilling the No. 5 coal prior to shooting and loading. The auger drill usually was kept on the surface and was lowered into the pit by the dragline.

Loading was done in the No. 6 pit by a P&H Model 700 shovel with 2-cu.yd. dipper, which was rebuilt with 29-ft. boom and 22-ft. sticks to give it a 25-ft. lift, necessary to reach to the top of trailers standing on a road at coal height. This shovel now is being used in the No. 5 workings. When working across rooms and pillars, the shovel would make a narrow road across the room and cut into the pillar, fanning out to each side until all the coal was removed. Then the shovel would pick up the refuse, or clean-up material, and throw it up against the high wall to make a 14-ft.-wide tractor-trailer road with a surface at coal height. The road was surfaced with a bulldozer and was widened at intervals for passing points. As each pillar was removed the road was extended until it reached the full length of the pit. At intervals, fills (Fig. 1) were made across the pit. Haulage units then pulled in on this fill and backed up the loading shovel. Like the dragline, the shovel also deadheaded back when a cut was completed, using for this purpose the haulage road.

As indicated above, the interval between the No. 6 and No. 5 seams is 35 to 37 ft. But immediately beyond the No. 6 outcrop, the No. 5 pitches sharply upward and flattens out for a distance of about ¼ mile—the usual limit of extension of the No. 5 beyond the No. 6 in the Carterville region. Overburden over the strippable part of the No. 5 on the McLaren tract averages about 32 ft., ranging from about 19 ft. at the outcrop and 23 ft. in the box cut to the stripping limit of 55 ft. Beyond that limit deep mining will be the practice. On the strippable area, No. 5 seam thickness ranges from 3 ft. 8 in. to 4 ft. 5 in., averaging 4 ft. Over the coal on about one-fourth of the acreage is a black slate, followed by gray shale, cap rock, and clay and surface material. Thickness of the hard material runs about 12 ft. as a rule.

The box cut to reach the No. 5 was started in November, 1937, by the 6W dragline, which now is used to take off the clay and surface material, provided it is less than approximately half the total thickness; otherwise it takes about half and lets the shovel, started in August, 1938, take the remainder.

The shovel referred to is a Bucyrus-Erie 225B steamer with 85-ft. boom and 58-ft. dipper sticks. The structural and mechanical qualities, however, have been improved by the installation of a 320B boiler, base, deckplates, etc. On the dragline the operator's cab has been removed from the base and installed in a new position high on one corner of the housing, thus improving the field of vision. A 6-cu.yd. dipper is installed on the steamer and, as the dragline is fitted with a 6½-yd. unit, a good balance is obtained as between the two units. The shovel alone, working five days a week, handles an average of 135,000 cu.yd. per month; the shovel and dragline together handle about 260,000 cu.yd.

Overburden drilling in the No. 5 workings is done with a sidewall drill making a 4-in. hole. As noted above, the No. 5 has not been mined before. A 25-ft. berm is carried for a roadway and 40 ft. of coal is loaded as a rule, making the width of the stripping cut and the depth of the holes also 40 ft. Overburden holes usually are drilled on 25-ft. centers where the black slate is present; if only gray shale is encountered, centers are increased to 30 to 35; if the cap rock is absent, holes are put in on 35-ft. centers. Overburden is shot with 30 per cent dynamite where the holes are wet; otherwise, Egyptian "Granular No. 2" pellet powder in 3½x16-in. sticks is used. Where black slate is present along with cap rock, the usual loading is 100 lb. of pellet per hole; in gray shale, the quantity is cut to 60 lb.

Rough cleaning in the pit is done by a Caterpillar "60" gas tractor with LaPlant-Choate bulldozer, followed by hand shoveling, etc. Holes are drilled 6 to 10 ft. apart, using the Hardsocg drill, and are shot with Egyptian "Strip Special," or pellet, powder in 2x8-in. sticks. Usual loading is 1½ sticks per hole.

Four tractor-trailer units do the hauling from the McLaren pit. Semi-trailers are Austin-Western units rated at 10 tons. Actual loading, however, averages 14 tons. These semi-trailers are pulled by one International and three White "718 Special" tractors. The maximum round-trip haul is 2 miles; the minimum is ½ mile. At present, the haulage units enter the pit by a short incline and then operate and turn on the coal. Provision is now being made for an incline at the other end of the pit, whereupon "circle" haulage will be inaugurated, with the units going only one way through the pit.

Tractor-Trailer Haulage

Tractor-trailer haulage was inaugurated with the beginning of the No. 6 stripping work in 1935. The original tires (9.75x20 and 10.50x 20) still are in service. The 1937 operating cost was 5.45c. per ton, divided as follows: labor—drivers, etc. 3.14c.; supplies—gas, oil, etc., 1.14c.; other supplies, 1.17c.; total supplies, 2.31c. In the first eleven months of 1938, the cost rose to 6.70c., divided as follows: labor—drivers, etc., 4.73c.; supplies—gas, oil, etc. 1.39c.; other supplies, 0.58c.; total supplies, 1.97c.

In addition to the equipment and facilities enumerated above, the McLaren operation is equipped with a washhouse with hot-and-cold showers and lockers, and a combination garage, machine and welding shop where all haulage units, tractors, etc., are parked. A concrete foundation and corrugated siding and roofing feature this building. Fifty-one men are on the McLaren Coal Co. payroll.

SUNSHINE ANTHRACITE

+ Sets Goal at 700 Tons per Shift

With Trackless Mining in Thin-Seam Coal

By IVAN A. GIVEN
Associate Editor, Coal Age

● Trackless mining in a thin seam employing mobile loaders for entry development and hand-loaded conveyors on walls 65 to 150 ft. long, plus face preparation with the removal of a middle band by cutting, is told in this story of the new Sunshine mine near Spadra, Ark. Conveyor transportation from all faces, feeding onto the underground system of belts and carrying coal up a 16-deg. slope to a bin on surface, providing about an hour's mine output storage in case of tipple stoppage, is followed by a final 1,500-ft. belt delivering to preparation plant. With three wall units and the required number of loading machines in operation, maximum production to the end of 1938 was 728 tons in one day, with a total of 140 mine employees, including supervisors.

WITH A SIZABLE list of mechanized deep and stripping mines to its credit in the Middle West, the Binkley Mining Co. turned to Arkansas in 1937 for its latest producing venture—a trackless mine in thin coal employing a combination of loading machines for entry driving and hand-loaded conveyors on walls 65 to 150 ft. long for the main tonnage backlog. A middle band in the seam is cut out and gobbed or sent to the outside for disposal. Chain conveyors are used for transportation in entries and behind wall conveyors, feeding onto belts for the second stage in the transportation cycle. From the underground belt system the coal is brought to the surface on still another belt installed in a new slope. A final 1,500-ft.-long belt conveyor on the surface moves the coal from a storage bin to the preparation plant, entirely overpassing the old mine workings which the tipple was built to serve.

Thin-Seam Mining

The new Sunshine mine, owned by the Sunshine Anthracite Coal Co., a subsidiary of the Binkley Mining Co., recovers the Spadra seam, ranging in thickness from 36 to 41 in., which moves to market as "Sunshine Anthracite." The present operation lies to the north and west of the old Sunshine mine, which had been in operation some 35 years on the room-and-pillar basis. Production, however, was small. The tipple now in use was built by the United Iron Works Co. in 1931, and as now constituted has a maximum capacity of close to 200 tons per hour. Average capacity of the belt feeding the plant, however, is 150 to 175 tons per hour, and the production objective, with all the underground equipment in service, is an average of 1,000 tons per day.

The Sunshine property, lying about three miles west of Spadra, Ark., was taken over by the present operating organization in June, 1937, and F. M. Schull, general superintendent of the Binkley operations—both deep and strip—in Indiana, was given the job of building the new operation as vice-president and general manager. After the investigation, it was decided to start entirely new, and consequently the old hoisting and air shafts were filled to seal the old workings.

Work on the new slope was started on July 1, 1937, and the coal was struck at a depth of slightly more than 112 ft. on Sept. 19. In addition to the regular entry work, a heading leading from the bottom to the site of the new airshaft was started immediately to permit the spoil from the shaft-sinking operation to be brought out by conveyor and thus speed this particular task. The first coal was run through the tipple on Sept. 27.

Length of the slope, sunk on a pitch of 16 deg., is 450 ft. Width is 12 ft. The first 140 linear feet of the slope is an open cut, which was made with a ¾-cu.yd. gas shovel. The remainder of the slope was put down by ordinary sinking methods. The slope belt was installed on one side, with stairs in the center and a material track equipped with a 20-h.p. hoist on the opposite side. The slope was timbered with 90-lb. rail crossbars on 4-ft. centers. As each bar was placed, the space between was filled in solid with 3x10-in. planking running from web to web of the bars.

Four-Heading Development

Four headings were started from the bottom to form the main opening for the underground workings, and the heading noted above was driven over to the site of the airshaft. In preparation for sinking the airshaft, a 12-in. hole was drilled to the coal. The shaft was sunk 10 ft. square to provide a clear 9x9-ft. cross-section after timbering. Depth was 112 ft. First, the surface material, clay, etc., was taken out down 30 ft. to the rock, where a horn set of 90-lb. rails was placed. Forms were built and braced and the shaft top was concreted to 2 ft. above the surface. Sinking was then started through the hard material, consisting mainly of a hard bastard limestone and hard gray slate. In the sinking operation, a 90-lb. rail was suspended on a rope operating over a

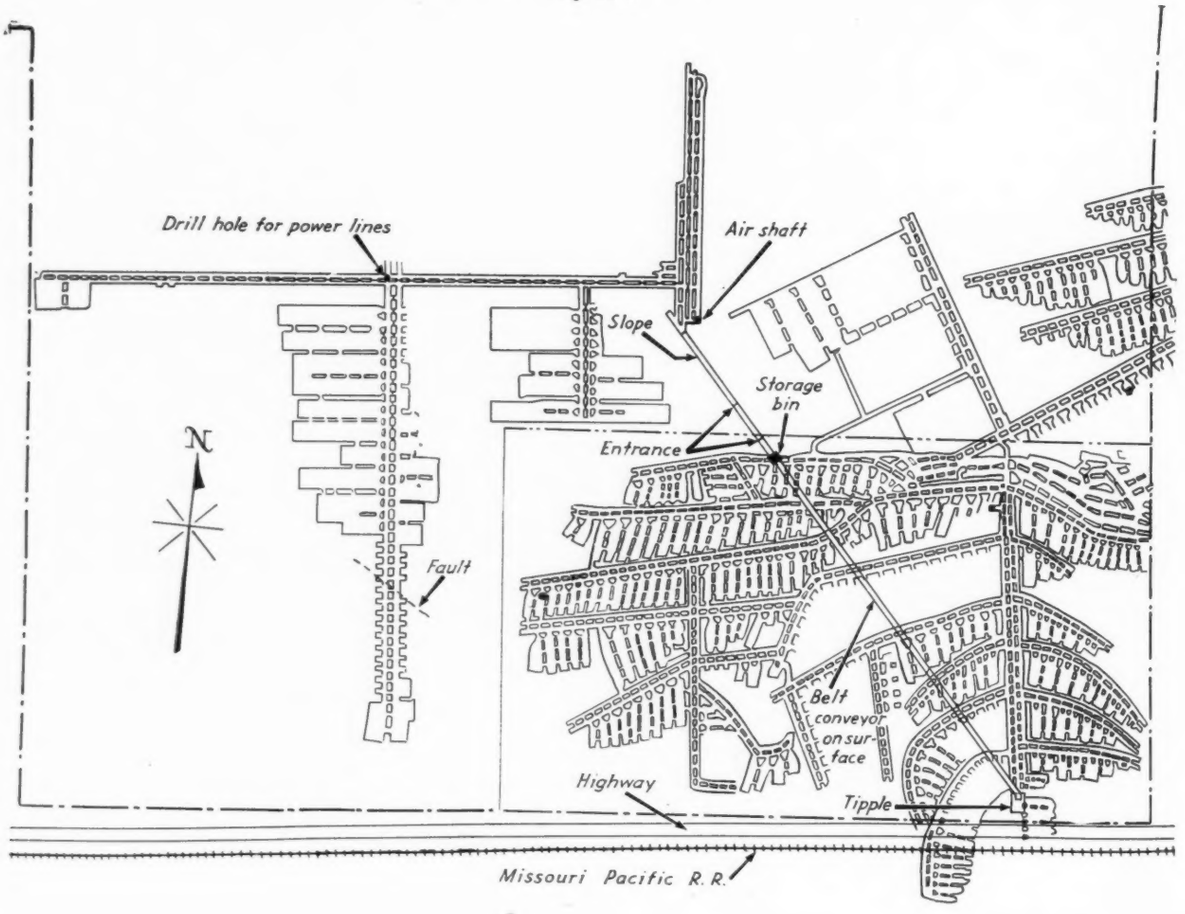
sheave. The holes then were drilled and loaded, and the rail was lowered until about half of it was in the 12-in. drillhole. The round of holes then was shot, whereupon shaking the rail resulted in the broken rock pouring down the drillhole to the chain conveyor below. Very little shoveling was necessary to muck a round of shots. In this fashion sinking through the 82 ft. of hard material required only six days of three shifts each. Sinking crews consisted of two men and a shift leader on each shift. This section of the shaft was timbered with pine. The original Buffalo Forge centrifugal fan was installed at the top of the shaft. Operating exhausting, this fan circulates approximately 60,000 c.f.m. It is driven by a 20-h.p. motor.

Length of the slope belt, a 26-in.-wide unit driven by a 30-h.p. motor and having a capacity of 150 to 175 tons per hour, is 600 ft., including a horizontal run of approximately 100 ft. at the bottom. This belt handles both mine rock and refuse and coal. The coal is discharged into a 150-ton wood storage bin, which enables the mine to run a maximum of about one hour in case of a tipple stoppage or vice versa. Adjoining the coal bin, a 100-ton rock-and-refuse bin was constructed. A plow installed over the latter bin is arranged so that it can be lowered onto the belt to divert refuse when it is being brought out of the mine. From the bin the refuse is disposed of by a small larry car operated by a 20-h.p. hoist.

No coal over 7 in. in size is shipped from Sunshine, and consequently a 10-h.p. McNally-Norton pick breaker with integral screen was installed at the storage bin for the breaking operation. The breaker is supplied by a reciprocating feeder driven by a 5-h.p. motor, and discharges onto the 1,500-ft. belt conveyor overground to the tipple. Driven by a 30-h.p. motor, this conveyor also is equipped with a 26-in. belt. The same size of belt (Goodyear in all cases) is used on the underground conveyors. The conveyors proper, however (Joy in all cases), are designed to take a 30-in.-wide belt in case it is thought desirable in the future. In addition to the main horizontal section, the conveyor from the storage bin to the tipple includes an inclined section to take the coal into the preparation plant at screen height. A wooden trestle on concrete foundations supports this conveyor, which is provided with a corrugated steel roof.

The tipple at present is equipped to make five sizes, as follows: $\frac{7}{8}$-in. screenings, $\frac{7}{8}$x1$\frac{1}{2}$-in. No. 1 nut, 1$\frac{1}{2}$x2$\frac{1}{2}$-in. No. 4 nut, 2$\frac{1}{2}$x5-in. egg, and 5x7-in. grate. Modifications made by the Sunshine Anthracite Coal Co. include electrification of the plant, the addition of roller-type mechanical pickers for the nut and egg sizes and the installation of an Ottumwa scraper-line box-car loader. With the exception of screenings, all sizes are hand-picked, in addition to mechanical picking as noted above, and are loaded over booms equipped with degradation screens. A degradation screen also precedes the box-car loader, and a roll crusher is available for breaking down large coal to screenings when necessary or desirable. The major breaking operation, however, as pointed out above, is at the storage bin.

Fig. 1—New work at the Sunshine mine lies to the north and west of the old mine, which was sealed. A 1,500-ft. belt conveyor connects the new slope and the tipple at the old hoisting shaft.



General dip of the seam at Sunshine is slightly over 2 per cent to the northeast, although local dips run considerably higher. Under the coal is a hard slate, while immediately over it is from 0 to 18 to 20 in. of drawslate. While this drawslate is good in places, it generally loosens from the overlying cap rock, which ran 2½ ft. at the airshaft. Consequently the drawslate requires constant watching and careful and systematic timbering. When the drawslate is taken down, the cap rock makes a very good roof. Over the cap rock is gray shale, gray slate and limestone up to the clay and surface material.

The seam also is characterized by an extremely hard middle band. Usually it has the nature of a sandy shale and has a fairly constant thickness of 2 to 3 in. This middle band is cut out and thrown back over the face conveyor on walls. In headings, the cuttings containing the band material are picked up by the loading machine and discharged back along the rib during the production shifts. On the clean-up shift, as will be detailed below, the loading machine is used to place these cuttings in the chain conveyor employed behind the loaders, thus giving the cuttings a start toward the refuse bin at the top of the slope. Cutting out the middle band, plus careful cleaning of the face and bottom before shooting, and picking during loading on the walls, make it possible to ship screenings with an ash of close to 6 per cent.

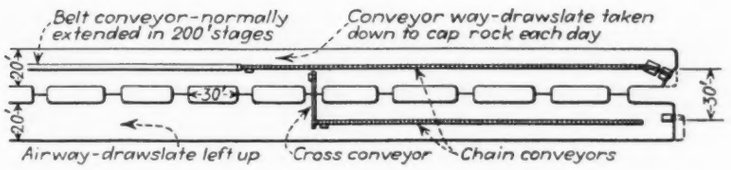


Fig. 2—Chain conveyors are used in advancing entries ahead of the main belts, which are moved up, as a rule, every time the face advances 200 ft.

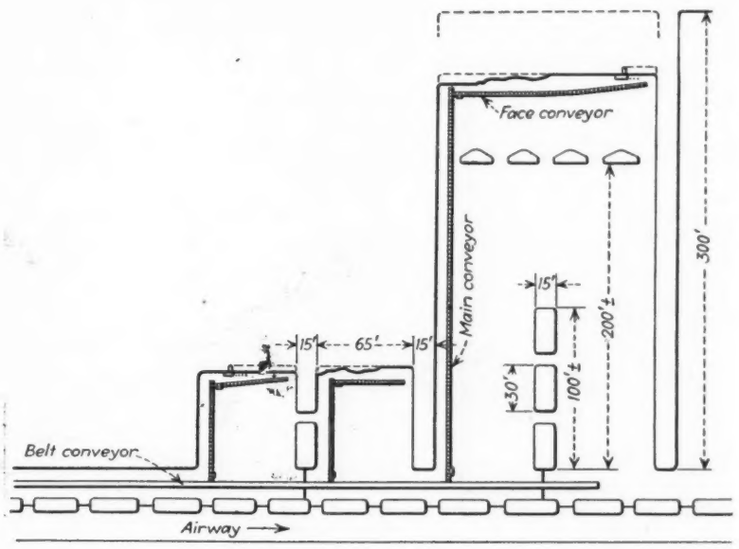


Fig. 3—In wall work, two 65-ft. faces are carried for the first 100 ft., after which they are cut together to make one face about 150 ft. long for the next 100 ft. The final 100 ft. of advance is preceded by renecking. Walls are served by chain conveyors, which discharge on belt units.

Mine Operating Schedules

Equipment at Sunshine is sufficient to permit operation of four wall units and three entries at a time. At the time this article was prepared, however, only three wall units were in operation, while only two entry groups were being advanced. In starting a wall, two 65-ft. faces are worked and consequently the equipment at this stage normally consists of two 15-h.p. Joy chain conveyors extensible to 300 ft. or more, two 5-h.p. face conveyors of either the conventional or Joy portable type, one Sullivan 35-h.p. CE-11 shortwall-longwall cutting machine and one 1½-h.p. Chicago Pneumatic hand-held coal drill. Cutting machines are equipped with 5½- or 6-ft. bars and two of the machines were rebuilt with ball-bearing equipment. Standard cutter chains and bits making a 6-in. kerf are employed, and the bits are tipped with Stellite, giving twice the tonnage per sharpening. Coal drills are fitted with Hardsoeg conveyor-type augers, molefoot heads and bits. One 3-h.p. drill is in service for brushing headings and also is available for coal drilling if necessary.

Headings are driven with Joy Jr. loaders. Three of these loaders, each equipped with five 4½-h.p. motors, have been purchased, and may be used separately in separate heading groups or two may work together in one heading group. These loaders discharge onto 15-h.p. Joy chain conveyors, one in each of the two headings which normally make up a group. A 5-h.p. cross conveyor brings the coal from one conveyor onto the other, which discharges onto a main belt unit. One new Sullivan "Master" shortwall cutter with hydraulic raising and lowering jacks making it possible to cut at heights of from 18 to 30 in. above the floor and greatly facilitating following the middle band across the face, is used entirely in advancing entries. The machine is equipped with a 50-h.p. motor and a 6-ft. standard-kerf bar. For moving this machine around two Joy low-vein transfer trucks, each powered by a 5-h.p. motor, are on hand in strategic locations. Only one is used at a time, however. Drilling in entries is done with the same type equipment as is used on the walls, with a large drill coming into service in brushing operations.

Mining at Sunshine is done on a three-shift schedule. The first shift is primarily production, particularly from the walls. Cutting, drilling and shooting, of course, are a normal part of the operating cycle on the first shift. The second shift is charged primarily with the responsibility of filling the storage bin on the surface and preparing for the production shift on the next working day, including finishing up any remaining cutting, shooting, conveyor moves, etc. The third shift is mostly engaged in cleaning-up operations, such as loading cuttings out of the entries, cleaning up spillage at conveyor discharges, brushing top in headings to be used for conveyorways, taking care of any remaining conveyor moves, and in general looking after the physical condition of the mine and equipment.

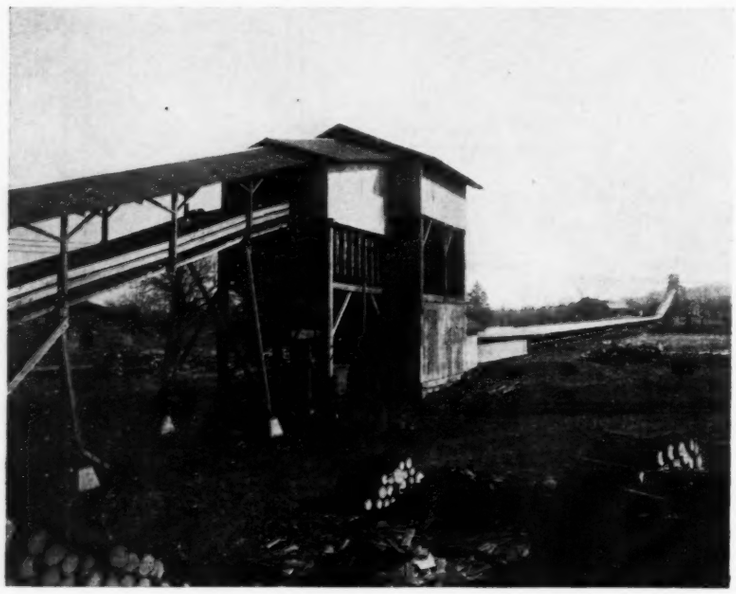
With three wall units and loading machines running as required, maximum production on this basis up to the end of 1938 was 728 tons in one

day. Total mine employees at the end of the year, including supervisors, was 140, divided as follows: top men, 25; first shift, 80; second shift, 25; third shift, 10. When the seasoning period is completed, it is expected this mine force will average 700 tons or more per day.

Although four headings were driven off the bottom, primarily to provide plenty of area for air travel, experience since that time has shown that a 20-ft. width is possible without roof difficulties and consequently all new work is being developed with only two headings 20 ft. wide on 30-ft. centers. In the heading to be used as a conveyorway, the full thickness of the drawslate is taken down, thus making the conveyorway height up to 18 to 20 in. more than the coal height. If the drawslate is absent—a rare occurrence—about 18 in. of cap rock is taken. No roof is shot in the headings to be used as airways, as taking the coal 20 ft. wide provides 60 to 70 sq.ft. of cross-section.

Heading crews consist of ten men, as follows: Joy operator and helper; two cutters; two drillers, who also load holes and shoot; two timbermen; one pan man; and a foreman. If only one heading machine is being used in advancing an entry, the machine is trammed back and forth between the usual two places through the crosscuts. If two machines are used, one in each heading, the runners alternate, although the cutting machine and drill are moved back and forth the same as if only one loading machine were employed.

The loading machine, or machines, discharge, as stated above, into chain conveyors, which in turn feed onto a main-line belt conveyor. The conveyors are laid in the centers of the 20-ft. headings, the 9- to 10-ft. space on either side giving the loading machine and other equipment plenty of room to travel up and down either rib. The conveyor on the airway side feeds into a cross conveyor, while the conveyor in the opposite heading, handling coal from both openings, feeds onto the belt.



The storage bin and breaker at the head of the slope are connected with the tipple in the distance by a 1,500-ft.-long belt conveyor. Refuse from the mine is discharged into the smaller bin in front of the main coal bin.

In this 20-ft.-wide heading, a new type shortwall is cutting out the middle band.

Always Timbering

Operations common to both headings include extension of the chain conveyors in steps of 5 ft. 11 in.—the length of a pan—drilling, cutting, disposal of the cuttings along the ribs —usually on the side opposite the crosscuts—loading of the holes, shooting, and loading of coal. In this connection it might be pointed out that, in view of the nature of the cuttings, the kerf and the face and bottom are carefully cleaned before the coal is shot. Timbering is a constant activity, single pine posts being set clear to the face and removed and reset to permit the loading machine, cutting machine and other equipment to operate. Prop centers seldom exceed 4 ft. except where a machine is actually working—a procedure made necessary by the treacherous nature of the drawslate. In headings to be used as conveyorways, taking down the drawslate for the length of the day's advance—usually around 50 ft. —is the final operation. This drawslate is drilled and shot on the third shift and is sent outside via the conveyor along with the cuttings and other refuse made during the day's work.

Inasmuch as the total seam height is only 36 to 41 in., taking a 6-in. cut out of the middle to a depth of 5 to 5½ ft. leaves two thin and relatively deep benches, posing in turn a difficult shooting problem, particularly when, as usually is the case, the upper bench tends to separate from the top and sag down. On the walls,

where hand-loading is the practice, this sagging or falling of the top bench makes no difference, as the men can split or break the chunks. With the loading machine, however, the coal must be broken up. Experimentation in entries is still going on to determine the type of coal-breaking medium to be used.

Four holes normally are drilled in the top bench in headings and four in the bottom. Top holes—one at each rib and two in the intervening space—usually are started down 6 in. from the top and drilled to the slate at the back of the cut. Holes in the lower bench are started as close to the bottom as possible and are angled downward as necessary to hit the rock in the back.

Belt conveyors normally are extended every 200 ft. of entry advance. At the time this article was prepared, three underground belts were in service, all 26 in. wide on 30-in. idler and return-roll sets and driven by 20-h.p. motors. With motors of this size, these belt conveyors can be extended to the maximum of 2,000 ft. Belt conveyors, with the exception of the original unit, are installed in the centers of the conveyorways, which are brushed as outlined above. One row of 6x8-in. sawed props on 4-ft. centers is set on each side of the conveyor. Distance between rows is 60 in. inside the props, which are topped by 3x10-in. sawed caps 18 in. long. On this basis, a travelingway approximately 7 ft. wide is left on each side of a belt unit. These roads are kept clear at all times. No track is used anywhere except on the slope. All materials are transported on small rubber-tired trucks, which are pulled around by the supply men, although investigation of battery-powered tractors is under way.

Ten Cuts Per Machine Shift

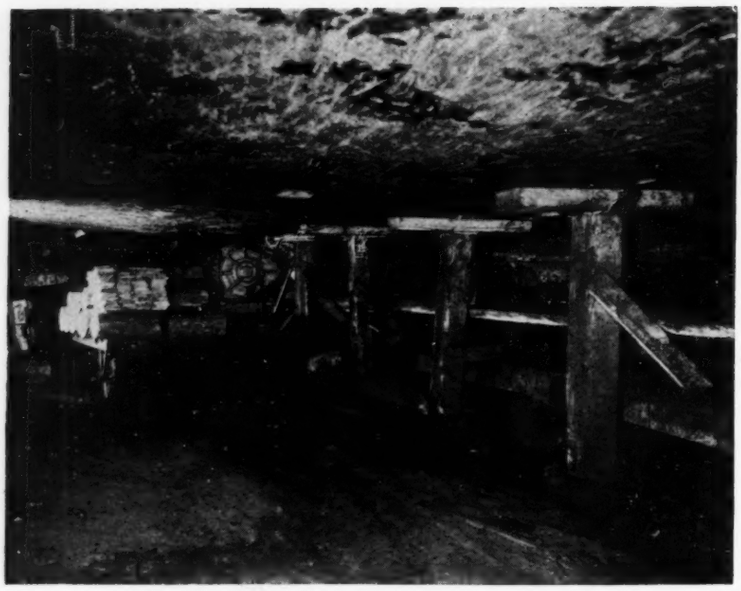
In driving entries with the loading machines the management aims at a total of ten falls, or cuts, per machine on the first shift, including crosscuts, and the same number on the second shift, although as many as fourteen cuts have been loaded out in seven hours. Loading twenty cuts in two headings and taking into account crosscuts means that an entry group moves forward approximately 50 ft. per day of two shifts and yields around 250 tons of coal, although this latter figure naturally is subject to some variation. When the schedule is adhered to, a 200-ft. extension of the belt conveyor must be made about every four days. In some cases, however, the chain-conveyor system has been extended to as much as 350 ft. In making a move-up, about ten man-shifts are required to dismantle the chain conveyors, store unneeded parts, move up and set the drives and tail pieces, and extend the belt conveyor 200 ft.

Retreat operation is the rule at Sunshine, by which is meant that the entries normally are extended to the boundary or other limit and then walls are turned and mined out on the way back. Usually, also, entries are driven so that the walls can be advanced upgrade. Under present conditions, furthermore, walls are generally turned off one side of an entry only, although in earlier work walls were driven from both sides. In the earlier work also, walls were established by cutting room necks together, but now they are started directly off the entry, as the extra support of the stumps formed in the necking operation was found to be unnecessary under the usual conditions.

Assuming, therefore, that an entry has been driven to the limit, the usual practice then is to take two slabbing cuts off the heading on the upper side. These cuttings are separated by a 15-ft. pillar and the length of each cutting is 65 ft. With a main and face conveyor to each

Loading machine at work in a 20-ft. heading. At the extreme left is the chain conveyor used in advancing the heading in steps of about 200 ft. Part of one of the shortwall transfer trucks shows at the extreme right.

"Breakers" at work on a 65-ft. wall in the Sunshine mine. At the right a face conveyor is discharging into a main conveyor.



Supplies are transported on small rubber-tired trucks pulled by hand. The drawslate has been taken down to the cap rock in this main conveyorway. An auxiliary belt is shown coming in from the left.

cut, or wall, they then are extended abreast a distance of 100 ft. During this stage, crosscuts are made every 40 ft. or so to leave pillars 30 ft. long between the two places. This frequent crosscutting was adopted to reduce the distance the cutting machine must travel in going from one wall to the other.

When the walls have advanced the first 100 ft., the 15-ft. pillar between them is omitted to form a face 145 to 150 ft. long. Usually at this time one face conveyor and one main conveyor are removed to new locations, leaving the other main conveyor and its companion face conveyor now lengthened to around 130 to 135 ft.—to finish the job. On this basis, the new and longer wall is advanced another 100 ft., whereupon new necks are made and cut together to provide small stumps and the wall is advanced to the maximum distance of 300 ft. from the entrance. The equipment is then moved down the entry and the process of advancing double and single walls is repeated, leaving a 15-ft. pillar between the new work and that already completed.

Sixteen Men per Wall Crew

Sixteen men comprise a wall crew, which is made up as follows: eight breakers, who break up the coal and load it on the face conveyor, doing their own timbering, etc.; two cutters; two drillers, who also load and shoot; two timbermen; one pan man; and a foreman. This crew takes care of two walls 65 ft. long or one long wall 145 to 150 ft. long. On the short walls, the breakers, cutters, drillers, etc., alternate back and forth. On the long walls, the usual practice is to work from one end to the other, the breakers, drillers, cutters, etc., following one another across. Breakers particularly, and in fact all crew members, turn their hands to any other work that needs to be done when not engaged in their regular tasks. Normally, a wall crew mines out four short faces or two long faces in seven hours, including necessary conveyor move-ups and other work. Yield on this basis is roughly 180 to 200 tons per shift.

After a wall, or a section of a wall, is cleaned up, it is drilled. Drilling is done at this stage of the game because it then is possible to slew the face conveyor forward after the machine has cut a part of the face, starting at the tail end of the conveyor, and to begin advancing the regular timbering. Otherwise, the conveyor would have to be left back to provide drilling room, which might result in a loss of time. As the cutting machine works its way across the face, the crew removes and resets props as necessary, usually completing or partly completing a regular row, on about 3-ft. centers, just far enough back from the face to permit them to pull the machine back when cutting is completed, in addition to other knocking and resetting as required. Cuttings are thrown back over the face conveyor into the gob. Other crew members—usually the drillers—clean out the kerf and clean up the face and bottom. The holes then are loaded ready for shooting. In the meantime, the face conveyor is moved up to the row of props along the face and the regular timbering is advanced behind it. Shooting is the last item, whereupon the place is ready for loading.

A total of about fifteen holes are all that usually are required in shooting a 65-ft. wall. Eleven of these holes are drilled in the bottom bench in the same manner as in the headings, making the hole centers nominally 6½ ft. As the top bench usually sags or falls after it is cut, except in the corners, holes are not necessary except for one shot on each rib and a few others in tight spots along the walls. At the time this article was prepared, Atlas 1¾x8-in. pellet was used on walls, although a decision had been made to change to FF powder. Using pellet, top holes were loaded with ¾ of a stick, or 6 in., and bottom holes were shot with 1½ sticks each.

The main chain conveyors receiving coal from the face conveyors are set 6 ft. from the rib. A row of pine props on about 4-ft. centers is set on each side of this conveyor, with occasionally a second row between the conveyor and the rib, leaving, however, a travelingway about 7 ft. wide. As the face conveyor is moved up to the prop row set during cutting, another row of props on 3-ft. centers is set along the back side of the conveyor. Then the regular timbering, consisting of rows of props on about 4-ft. centers, with the rows 5 to 5½ ft., or the depth of the cut, apart, is brought up. As the breakers remove the coal in front of the conveyor, props are set as needed, usually on centers of not over 4 ft.

Ample Support for Full Depth

Timbering as above, plus the chain pillars for the first 100 ft. and the stumps of the second 100 ft., give ample support until the walls can be worked to the full 300-ft. depth, whereupon the machinery is taken out and the place left to its own devices. If the timbers are removed or lose their strength, which is a matter of a relatively short time, as they are cut from pine, the place will cave to the surface, as experience already has demonstrated.

All underground equipment, as well as that on the surface, is operated with 220-volt alternating current. Underground circuits consist of three insulated wires, one for each face, which are taken down into the mine from two transformer sta-

tions (three 75-kva. units each) on the surface. One of these transformer stations is at the airshaft and serves also the slope belt, material hoist, refuse hoist, feeder and pick breaker. The other station is at a borehole about 1,100 ft. west of the airshaft. The tipple load and the other surface loads, including the 1,500-ft. belt conveyor, are supplied by a third transformer station (three 50-kva. units) at the tipple. Some direct current is employed, however, as in charging the Edison cap lamps used underground, etc.

NEW ELECTRIC SHOP

+ Serving Berwind-White Mines

Designed for Convenience and Comfort

● Special armature handling racks and trucks, an improved baking oven, a sealed receiving and cleaning room, an office near the center of the workroom, and a building construction aimed at comfort to the workmen are outstanding features of a new electrical repair shop of the Berwind-White Coal Mining Co. at Windber, Somerset County, Pennsylvania. It provides facilities for four active mines ranging from 2,500 to 4,000 tons daily production.

RECOGNITION of the importance of efficient maintenance and evidence of an accumulated experience in shop objectives radiate from the new facilities of the electrical shop of the Berwind-White Coal Mining Co. in central Pennsylvania. The shop was built to replace one which had been situated for many years in an old brick building that had become inadequate and did not lend itself to remodeling. Both old and new shop buildings are at Mine No. 35 and about a half mile from the operating office in Windber.

The shop is situated with adequate spacing from other buildings so as to obtain full advantage of natural lighting and ventilation on all four sides. Dimensions are 40x115 ft. and the eaves height is 20 ft. Construction is steel framing and steel roof trusses, brick walls and steel sash. A hip roof, supported on corrugated steel sheeting, contains 2 in. of heat-insulating material.

Overhead lifting equipment consists of two chain blocks trolley-hung on bridge cranes which span the width of the shop and operate over the full length. One crane has a capacity of one ton and the other two tons and both are manually operated. Heat is supplied to the building by four steam-radiator-blower units mounted overhead and which are operated as air circulators during hot weather.

Inside floor dimensions of the baking oven are 9x16 ft.; the brick walls are 12 in. thick. Heat is supplied from a 150-lb. steam radiator mounted on top and equipped with a blower which drives the hot air down through ducts in the ceiling of the oven and discharges it at the bottom. Part of the air is discharged outside of the shop and the rest is recirculated to the blower intake.

Fig. 1—Work benches, armature stands and power tools on one side and shop-material bins on the other. The oven is in the background at the left.

Fig. 2—At the right, the glass-inclosed office which is spaced away from the wall and is situated near the center of the shop. The dust-tight cleaning room is in the left background.

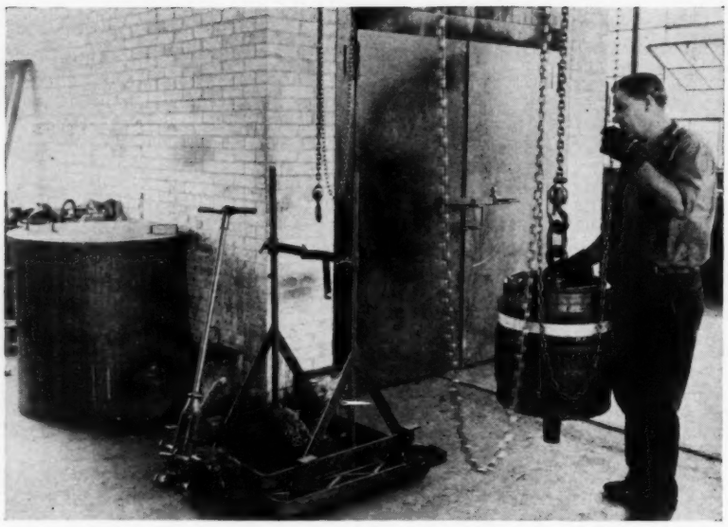


Fig. 3—Getting ready to place an armature in the carrying rack which is already on the lifting truck.

Fig. 4—Wheeling the truck toward the doors of the oven.

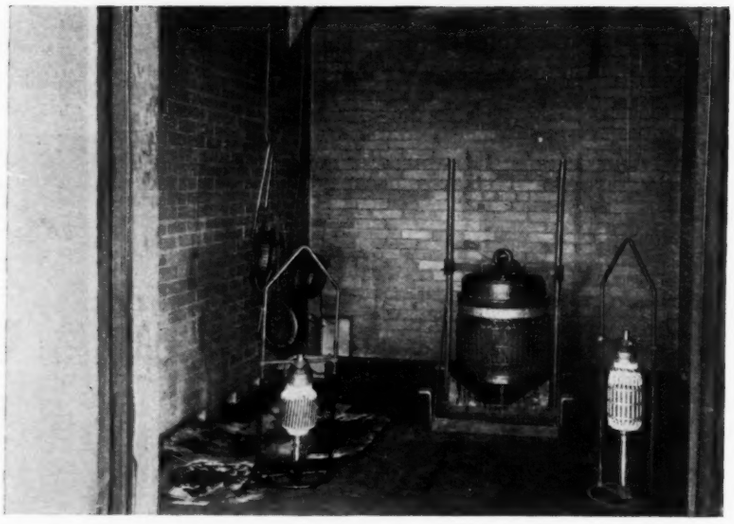


Fig. 5—Armatures in the oven, on carrying racks. Steam-heated air is forced through the oven.

Steam is supplied by a central heating plant. This oven, with forced circulation, has proved much more rapid and efficient than the oven of direct-radiation type used in the old shop.

To get away from space limitations and other disadvantages of a track extending into the oven and of handling heavy armatures on the ordinary type of four-wheeled truck, special armature-carrying racks were built and commercial-type lifting trucks purchased to transport these racks to and from the oven. Figs. 3, 4 and 5 illustrate the progressive steps in placing a large armature in the oven.

In Fig. 3, the armature, supported from a bridge crane as it is during dipping in the vat at the left hand, is about to be placed in the carrying rack which is already on the lifting truck. The bottom end of the shaft will rest on the V-notched wooden block and the adjustable bar at the top will be clamped to the upper end of the shaft.

Fig. 4 shows this same armature being moved toward the oven door and Fig. 5 shows the armature and its carrying rack or stand after they have been lowered onto the floor of the oven and the carrying truck has been removed. Obviously this method provides convenient and safe handling and allows the armature to be placed at any vacant space available on the oven floor.

Racks for Small Armatures

For handling small armatures, dipping and baking, racks of the type shown in Fig. 6 are used. A useful feature is the circular base on which the rack and its armature can be moved along the floor by being held at an angle and rolled. The top of the frame is shaped to an inverted V to provide a central point for hooking a supporting chain during dipping.

One corner of the shop has a 15x15-ft. receiving room which is sealed to prevent dust escaping to the main room of the shop. In this receiving room incoming armatures and other electrical parts are cleaned by air jet and/or by a naphtha spray gun which removes grease. While engaged in this cleaning the workman wears a respirator; at the same time a blower is kept in operation to force fresh air in from the main room and simultaneously expel the foul air through windows that have been opened in the outside walls of the receiving room. This blower, as viewed from the main room, is shown in Fig. 7. When flame heat-

Fig. 6—Small armatures in their special racks are moved by rolling in a tilted position.

ing of any part is necessary, it is done in the receiving room; thus the main room is protected also from fumes of combustion.

The office is a steel and glass inclosure 8x8x8 ft., and, as indicated by Fig. 2, it is situated about midway of the length of the shop and away from the side wall but is in line with six double-faced steel bin sections. All coils and also the usual line of shop supplies are stored in these bins. Maintaining this shop stock is one of the duties of the shop foreman.

Illumination consists of twenty-four 300-watt 110-volt Mazda lamps in porcelain enameled steel reflectors, all hung above crane height. Work benches and tool cabinets are of steel.

Electric motors in use at the mines served by this electric shop total 1,500 and the number of spare d.c. armatures is 130. All d.c. motors are 550-volt. A.c. motors are principally 440-volt, but a few 110-volt and 6,600-volt motors are in use. A total of nearly a thousand 5- and 7½-hp. room hoist motors are included in the d.c. equipment. These room hoists are used instead of cable-reel or battery locomotives.

Approximately 90 per cent of the armature coils and fields are made in the shop. Exceptions are those for which there is so little demand that it would not pay to build the special winding forms. Cotton-covered wire is used except that asbestos insulation is used on certain locomotives whose motors operate at excessive temperatures.

Armature test equipment includes a growler (a.c. magnet), step-up transformer (220 volts to 3,000 volts maximum) and a bar-to-bar buzzer outfit. The 550-volt armatures must withstand a 1,500-volt a.c. 60-cycle test from commutator to shaft before being dipped in baking varnish. The dipping is preceded by heating for 8 hours in the oven. The armature is dipped and then hung above the tank until dripping has ceased. This is repeated and then the armature is returned to the oven to be baked until the varnish is thoroughly dry. As a final test at 550 volts d.c., an ordinary voltmeter when in series from commutator to shaft must show a zero reading.

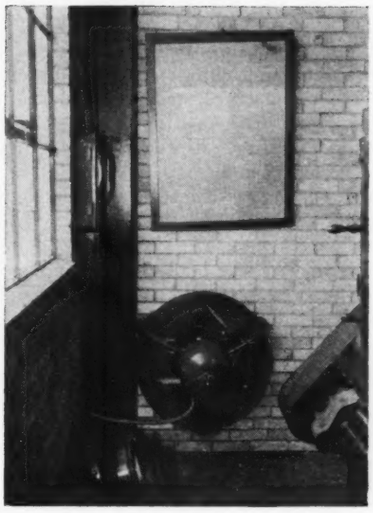


Fig. 7—This blower in the wall of the cleaning room forces air from the shop proper into the cleaning room and thence out through a window.

Two years prior to the building of the electrical shop a new machine shop and a new supply house were built. A fire which burned the old machine-shop building prompted that improvement. Now all three departments are housed in modern buildings.

60-KW. POWER UNIT

+ Handles 155½-Hp. Connected Load

At Fort Hartford Coal Co. Mine

"FORT HARTFORD—the first fort in western Kentucky—was erected prior to 1785 on Pioneer Gabriel Madison's land 300 yd. northwest of this spot on the bluff overlooking Rough River" reads a tablet in front of the court house at Hartford, Ky., the county seat of Ohio County. From this early military establishment the Fort Hartford Coal Co., with a mine at Tishenor, Ky., takes its name. But a name handed down from the early days is not the only distinguishing feature of the operation where facilities include a 60-kw. diesel-driven d.c. generator which supplies the entire power requirements of a mine with an average daily output over a period of a year of 485 tons.

The present Fort Hartford plant has been built up since 1935, when the present owners took over, with Connis Hall as general manager, on the same site, an old solid-shooting mule-haulage mine with coaling station handling about ten tons per day. In addition to the power unit hereinbefore noted, equipment and facilities installed since that time include the following: new opening, 60-lb. main lines, new mine cars, cutting machines, drills, main-line loco-

motives, pump and fan units, shop facilities and a new three-track wood-frame tipple equipped with a crusher and screening equipment for making three sizes, supplemented by picking facilities and loading booms for lump and egg. Tipple construction, of course, included the installation of the necessary empty and loaded tracks.

The average working force consists of 40 hand loaders, 13 day men on the inside, and 12 day men on the outside. Coal reserves consist of a 1,280-acre tract of No. 9 coal, averaging 4 ft. in thickness. Two main partings now are in service about one-half mile from the tipple. About 700 ft. of this haul consists of an outside line on a grade of about 2¼ per cent against the loads. Cars are handled between the partings, or "lie-aways," and the room faces by mules. The room-and-pillar plan of mining is followed, and good top conditions permit driving places 35 ft. wide.

Although a power line crosses the property, the Fort Hartford organization chose a Caterpillar "13,000" power unit on the basis of expected savings of around 66⅔ per cent. This power unit consists of a 6-cylinder 120-hp. diesel engine driving, through a coupling, a 60-kw. 250-volt (full load) 900-r.p.m. Type CD Form AL General Electric d.c. generator. Continuous rating of the generator is 240 amp. with a temperature rise of 40 deg. Along with the power unit the company purchased a fuel-storage tank (550 gal.) equipped with strainers, etc., and a General Electric switchboard on which is mounted a plain d.c. air breaker, ammeter, voltmeter and voltage-adjusting rheostat. The cooling system for the engine holds 31 gal. Prestone is used in the winter, the original quantity still being in service with additions to bring the total up to about 16 gal. out of 31.

Table 1—Connected Load, Fort Hartford Mine

*Underground**	Hp.
Goodman 12-AA shortwall cutter, 6½-ft. bar	50
Sullivan CE-7 shortwall cutter, 5-ft. bar	35
Two Little Giant coal drills	2
Pump	5
Total	92*
Haulage and Surface*	
4-ton Jeffrey locomotive (originally a crab-reel unit, two motors)	34
Fan	7½
Tipple: shaker-screen motor	10
Boom motor	1½
Conveyor motor	3
Crusher motor	7½
Total	63½*
Grand total	155½*

* Exclusive of a 6-ton Goodman trolley locomotive (two 30-hp. motors) kept on hand for emergency service and a Joy, Jr., loader equipped with five 4½-hp. motors, not now in use. When the loading machine was in service, the connected load totaled 178 hp.

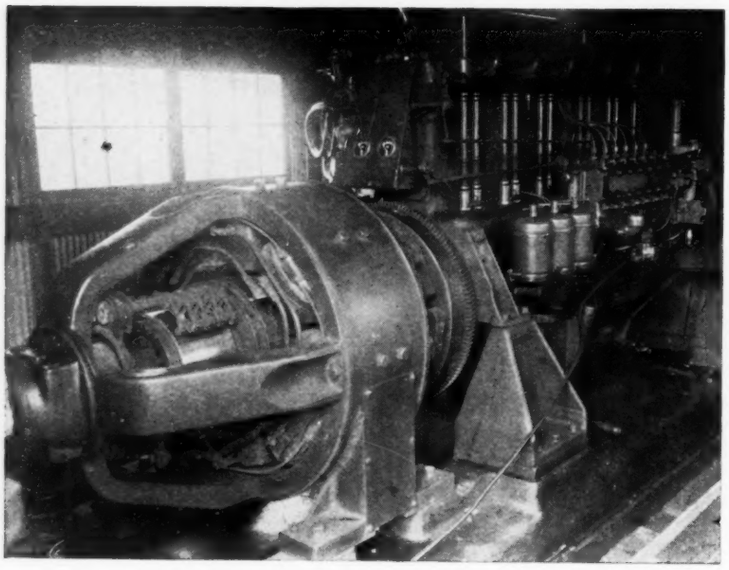
The generator feeds a d.c. distribution system consisting of 4/0 trolley wire with a rail return bonded with 4/0 bonds developed by the mine management (p. 56 of this issue). In view of the relatively high connected horsepower, as compared with generating capacity, extra care is taken to assure a good bonding job. Both rails of the main line are bonded, with cross bonds every 200 ft. or so.

Connected load at the Fort Hartford mine at the present time, using the regular 4-ton locomotive, totals 155½ hp. The individual items in this load, excluding only one or two motors used only occasionally, are listed in Table I. When the loading machine was in service the connected load was 178 hp. This load was carried by the power unit without appreciable difficulty and with only the normal number of breaker operations which might be expected with even a larger power unit. When the 6-ton locomotive must be used, which occurs in case of trouble with the regular 4-ton unit or while it is being overhauled, it is necessary, however, to stop the 50-hp. Goodman cutter to prevent excessive breaker operation, particularly when the locomotive is pulling up the grade from the pit mouth to the tipple.

One cutter is equipped with a Cincinnati "Duplex" chain and bit; the other with Bowdil chain and bits. Use of such bits is considered a major item in successful operation with the small power unit installed. As an example, the average of observed meter readings with one of the cutters equipped with regular bits was 250 amp. Installation of the patent bits brought this down to 150 amp. Heavy rail on the main line is another helpful item, along with the use of anti-friction bearings on the mine cars. Twenty of the mine cars in service at the present time are equipped with Sanford-Day "Floater" ball-bearing wheels (Fafnir bearings) and the other 40 with Timken wheels. Anti-friction bearings also will be installed on a number of additional cars as they are brought into service. The 4-ton haulage locomotive handles trips of eight cars holding about 1¾ tons of coal each and seldom varies more than 10 or 15 seconds from a 10-minute schedule throughout the entire day, delivering an average of 300 cars to the tipple for an output of 485 tons.

The power unit went into service on Oct. 12, 1936. Cost of the unit proper (engine and generator) was $5,400. The switchboard and rheostat represented an expenditure of $285, and the fuel tank, $60. Fuel-oil cost is about 0.6c. per kilowatt-hour. Since installation of the unit, two complete sets of connecting rods, costing a total of $104, have been installed. Labor cost of installation was approximately $50, bringing the total cost of repairs to the unit to around $154 in two years.

Consisting of a six-cylinder diesel engine and a 60kw. d.c. generator, this Fort Hartford power unit serves a normal connected load of 155½ hp.



325 TONS DAILY

+ Treated at Disco Plant

Of Pittsburgh Coal Carbonization Co.

By C. E. LESHER
President

and R. E. ZIMMERMAN
Research Engineer
Pittsburgh Coal Carbonization Co.

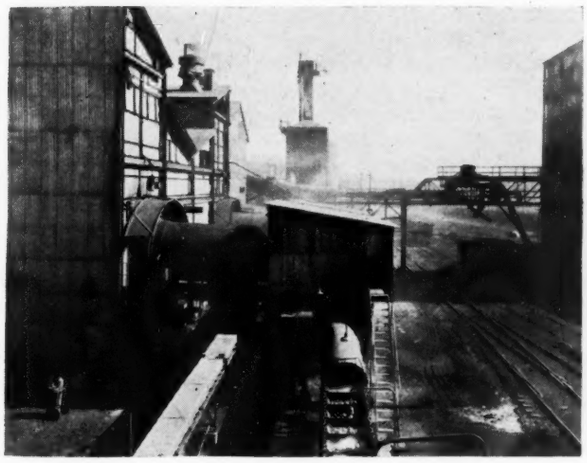
TO FIND use for the thousands of tons of "sludge" produced at its coal-cleaning plants and to meet a market seeking a smokeless, clean, trouble-free, reactive, solid fuel, the Pittsburgh Coal Co., in 1928, began to interest itself in the manufacture of such a product. The many previous failures to make, at reasonable cost, a satisfactory fuel by any such methods made the company careful to proceed with conservatism and caution.

In 1929 and 1930, studies and tests of low-temperature distillation were made in England, Germany and other European countries. Two hundred tons of the company's Pittsburgh coal was sent over to be tested by the Plassman process in Germany and the Illingworth process in England, under the supervision of the company's own engineers, and the product of these tests was brought back to America. This work followed extensive tests on the same coal in the Wisner process test plant at Philo, Ohio.

Pittsburgh Coal Carbonization Co. was organized to carry on the development, and a 3-ton-per-day pilot plant using the Illingworth process was erected at Champion No. 1 cleaning plant, and operated for eighteen months. The Illingworth process uses cast-iron retorts and its operation is of intermittent type. At about the same time a pilot plant using the Wisner process was erected at the same location. In this process operation is continuous and carbonization is effected in revolving steel retorts; the product is in the form of more or less irregular but homogeneous balls. From January, 1932, both pilot plants were in operation and many kinds and sizes of coal were tested. At the conclusion of the tests, the Wisner process was selected for further development. Clarence B. Wisner, inventor of this process, was active in the planning and operation of the test plant until his death in November, 1932.

Two major problems were faced. The first was to develop machinery capable of continuous operation under load at elevated temperatures. Without dependable machinery, the process could not be adequately tested or proved. Thus the most exasperating task was making the wheels go, and, from the experience obtained in this pilot plant, new

Left—Disco leaves carbonizers at this end of the plant. The discharge end of unit No. 3 lies between the building on the left and the shed in the center. That of Unit No. 3 can be seen beyond it. In the foreground center is a drag conveyor taking the product to the cooling and screening plants. To the left of the drag is a covered belt conveyor which takes breeze, which is recirculated, to the crushing and storage equipment in the upper center. Gantry crossing railroad tracks brings dust from Champion cleaning plant. Right—Furnace-size Disco being loaded at screening plant.



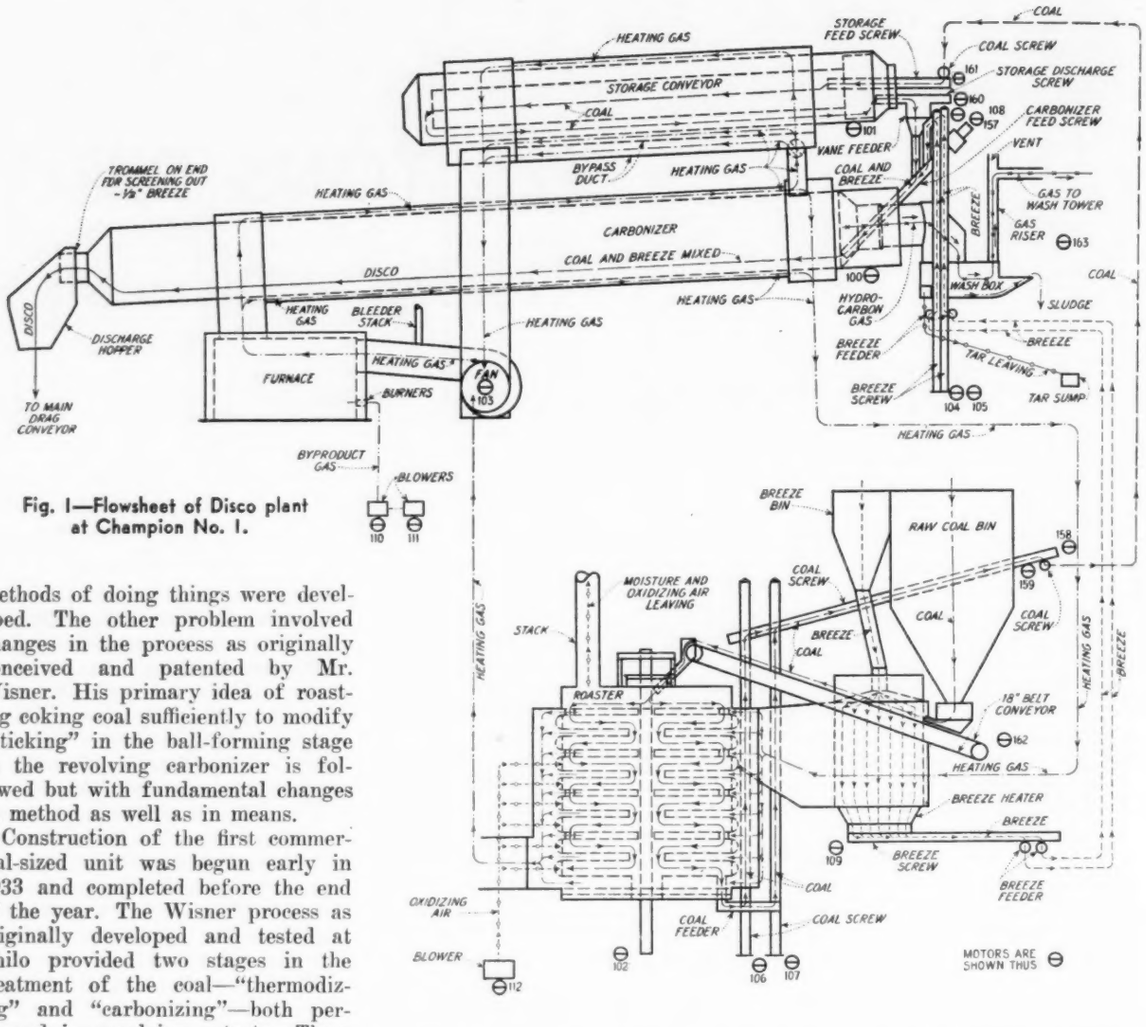


Fig. 1—Flowsheet of Disco plant at Champion No. 1.

methods of doing things were developed. The other problem involved changes in the process as originally conceived and patented by Mr. Wisner. His primary idea of roasting coking coal sufficiently to modify "sticking" in the ball-forming stage in the revolving carbonizer is followed but with fundamental changes in method as well as in means.

Construction of the first commercial-sized unit was begun early in 1933 and completed before the end of the year. The Wisner process as originally developed and tested at Philo provided two stages in the treatment of the coal—"thermodizing" and "carbonizing"—both performed in revolving retorts. These retorts were constructed with two concentric shells, the coal passing through the center shell and the heating gases between the two shells. The outer shell was insulated and the heating gases were admitted through more or less complicated seals. In the first unit erected at Champion, the carbonizer, with an internal diameter of 6 ft. and about 90 ft. long, was of this orthodox design.

A refractory-lined furnace is located at the lower end of the carbonizer. Heating gas from the furnace is introduced through a hood and seals to the heating ducts of the revolving carbonizer at a controlled temperature of about 1,000 deg. F. and countercurrent to the flow of coal. After passing the length of the carbonizer the heating gas is removed through similar seals and hood at the upper end and returned to a fan through ducts which heat the roaster or "thermodizer." Through the carbonizer the temperature of the gases drops roughly from 1,000 to 875 deg. F. and, through the roaster and to the fan inlet, from 800 to 600 deg. F. The outlet of the fan leads directly into the furnace, where the products of combustion of the gas burner are added in sufficient quantity to raise the temperature of the gases to approximately 1,000 deg. F. Thus, the heating system of the process is that of a closed circuit in which excess gas is vented at the point of lowest temperature: namely, between the furnace and fan. At no point in the process do the products of combustion meet the coal being processed.

Instead of a revolving retort as a "thermodizer," a roaster was designed and built with rectangular hearths over which the coal is carried by rabbles on crossbars attached to chains of standard design. The roaster on the first unit built has four hearths containing a total of about 900 sq.ft. of hearth area. The heating gases are in closed ducts below each hearth and the hearths are cast-iron plates resting on the heating ducts. Coal is introduced at the top deck and taken off at the bottom deck after about one hour's treatment. Air for oxidation is introduced through suitable openings.

An important development gained from the experience in operating the pilot plant was the discovery that an intermediate step between roasting and carbonizing is necessary. This intermediate step is described as the "storage conveyor." In the first unit, the product of the roaster is elevated by vertical screw conveyors to the storage conveyor. This unit has two rectangular hearths of essentially the same dimensions as those in the roaster but with the heating duct under the lower deck only. It is wholly inclosed and insulated, as is the roaster. The roasted coal is carried continuously around by buckets attached to a chain of standard design.

Roasted coal is dropped into the storage conveyor at one end of the upper hearth, carried along that hearth, dropped down to the lower hearth, and returned. The buckets fit close to the bottom and sides of the conveyor inclosure, and its bottom and end are so constructed that

the buckets carry the coal upward from the lower to the upper deck on the return trip. Thus the material in the "storage" is carried around and around. An opening in the bottom of the storage conveyor inclosure permits withdrawal through a star feeder of a predetermined quantity, which in turn is fed to the carbonizer. Temperature of the coal in the storage conveyor is maintained at about 600 deg. F.—the temperature at which it left the roaster.

The function of the storage conveyor is to provide a reservoir between roaster and carbonizer, and thus make possible a uniform feed to the latter, to mix the roaster product and thus to provide a carbonizer feed that is uniform in quality as well as quantity, and in addition thereto to permit "aging" of the material prior to carbonization. Aging at the elevated temperature of 600 deg. F. helps reduce the stickiness of the coal.

Following the successful operation of the first unit, a second unit, embodying certain radical changes in design and equipment, was built and put into operation by October, 1935. The carbonizer of this unit was made 8 ft. in diameter and about 100 ft long. The two concentric and revolving shells were abandoned for one single revolving shell and a fixed or stationary outer hood extending its entire length; the heating gases pass between the hood and the revolving shell or drum. This greatly simplified construction and, of course, was cheaper. In addition to less maintenance, particularly of insulation, such a design also eliminated two heating-gas seals. The slope of the second carbonizer is $\frac{1}{8}$ in. per foot in the direction of discharge as against $\frac{1}{3}$ in. per foot for the first one. Its speed of rotation is 3 r.p.m. as against 5 r.p.m. for the first carbonizer.

In this second unit an entirely different type of roaster and storage unit is used. The roaster—a circular, multi-hearth Wedge-type rabble roaster, manufactured by the Bethlehem Foundry & Machine Co.—has

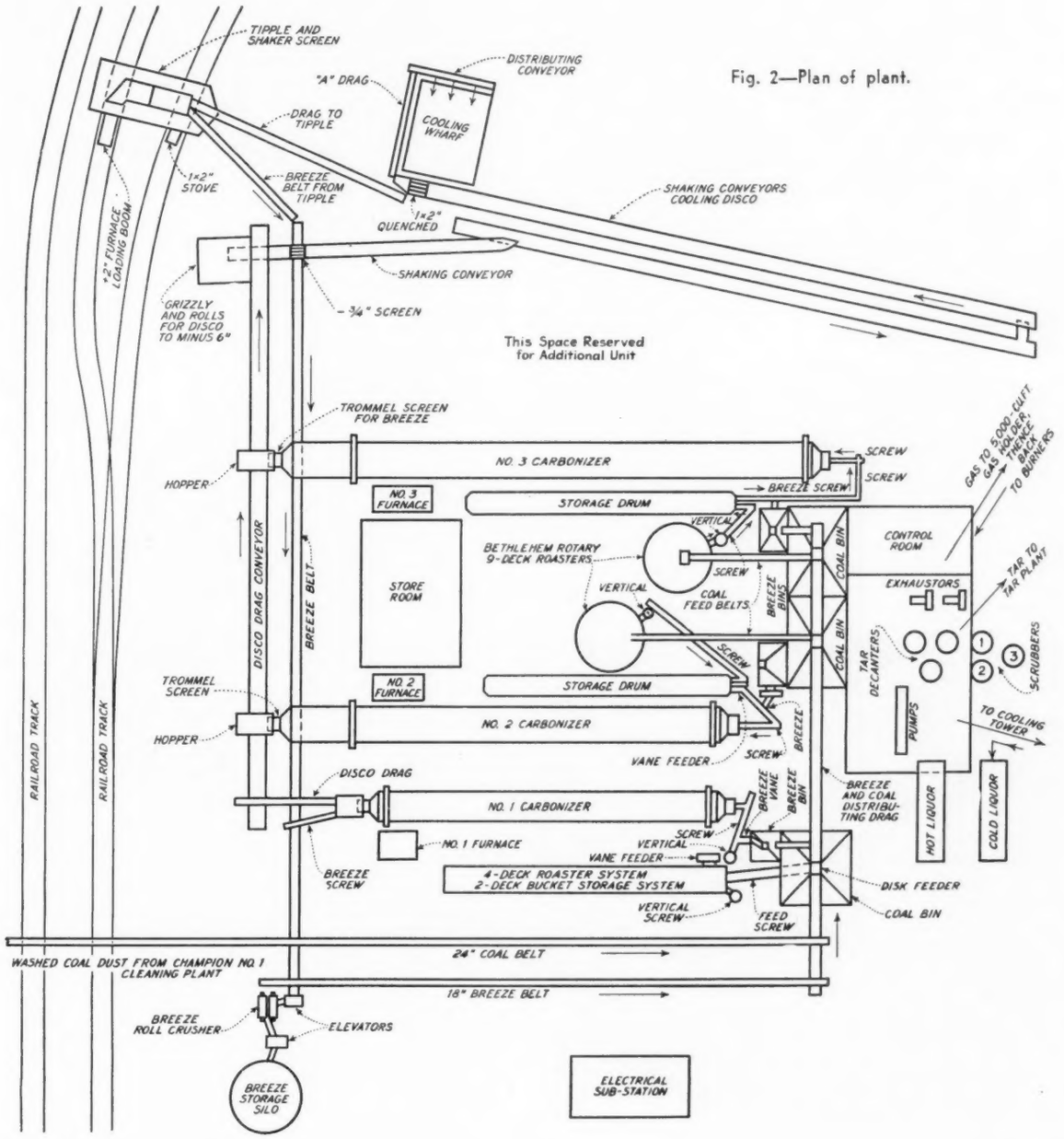


Fig. 2—Plan of plant.

nine indirectly heated hearths with rabbles fastened to four arms at right angles on each deck, and operated by a central shaft at about two revolutions per minute. Coal is delivered near the center of the top deck and is plowed by the rabbles, which stir and distribute it in a thin layer over the hearth to the outer circumference, where it is dropped through holes onto the deck below. On this deck the rabbles are so set as to carry the coal to the center for discharge to the next deck, and so on, until the coal is discharged from the machine.

The nine hearths have 2,000 sq.ft. of hearth area. There is no direct contact between the heating gases and the coal, as the former, after passing between the inner and outer shell of the carbonizer, go through heat ducts under each hearth of the roaster. The quantity of heating gases passing through the ducts of any one deck can be regulated by suitable dampers.

In place of the storage bucket-conveyor system used in No. 1 unit, a drum or cylindrical apparatus was selected. It consists of a double tube 75 ft. long in which the roasted coal enters the inner tube at the upper end and discharges in part at three openings distributed along its length and completely discharges at its end into the outer tube, which is 7 ft. in diameter and equipped with spirals which carry the coal back up to the feed end, where a variable-speed star feeder discharges the coal to a screw conveyor leading into the carbonizer. Recirculation of coal is maintained by lifters which carry the excess over that fed to the carbonizer back to the central tube. This drum is surrounded by a stationary jacket and heating gas is circulated along the drum sufficient to maintain the coal at the roaster-discharge temperature of 600 deg. F. The storage drum rotates at 2.75 r.p.m.

Unit No. 3, construction on which was begun before unit No. 2 was completed, was put into operation in April, 1936. This unit duplicates the second in all important points of design except that the carbonizer is larger. The revolving shell is 126 ft. long but with the same diameter, 8 ft., as No. 2. The slope was increased to ½ in. per foot.

The discharge end of all three carbonizers is provided with a short cylindrical screen of ½-in. round perforations which screen out the minus ½-in. breeze. This breeze is collected by a screw conveyor and sent to a storage bin. Breeze from the coke-handling system and from the screen at the loading tipple is gathered and carried by belt conveyor to a roll crusher where it is crushed to minus 4 mesh and sent to this same bin. The breeze is drawn out of this bin as needed, sent to small bins at the feed end of each carbonizer, from which it is drawn out as required, passed through preheaters (tubes in the heating gas duct from the carbonizers to the roasters) and mixed with the roasted coal entering the carbonizers. Thus normally all undersize product is recirculated through the carbonizer as an important part of the process for controlling size and quality of the final product.

The solid product of all drums is collected on a gathering conveyor, passed over a 6-in. rotary grizzly and the oversize reduced in a roll crusher. Shaking conveyors carry the product to the cooling system. Early in the operation of the plant it was discovered that wet quenching of the hot product as it discharges from the retorts was deleterious to the strength of the particles and that if it were cooled without the use of water the product would be greatly improved. The effect of water on the larger pieces is particularly detrimental, as shrinkage cracks develop which cause degradation. An extensive investigation was made of the cooling characteristics of Disco and a system of air cooling developed which has proved satisfactory.

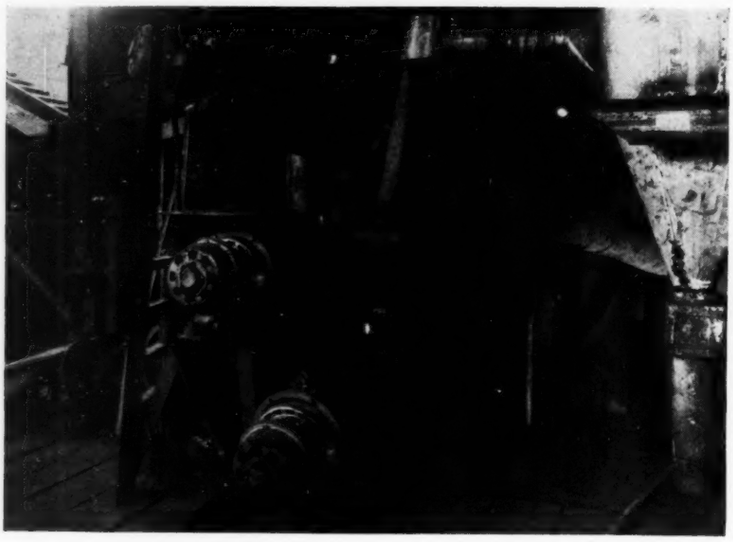
Cooling the Hot Product

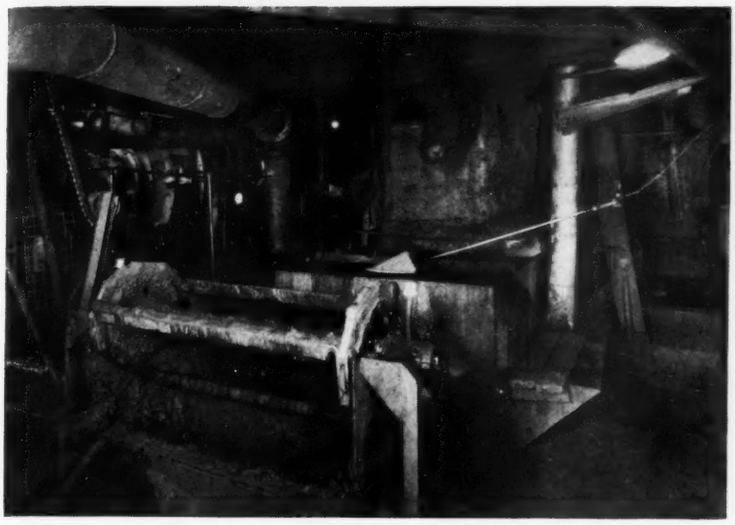
Disco is a highly reactive fuel. Upon being discharged from the carbonizers the center temperature of the particles is close to 850 deg. F. and if the lumps at that temperature are allowed to remain stationary and in contact with each other for a few minutes they will catch fire. Small and frequent movement of individual pieces, while cooling in air, will prevent firing, and the system of cooling in use depends on this fact. The Disco is first passed over shaking conveyors for 30 minutes. Then the minus 2-in. material is screened out and thoroughly quenched with water. The oversize Disco is cooled for two hours on a mechanical cooling wharf, which is a series of slotted cast-iron hinged grates in steplike formation, the whole inclined at an angle of 18 deg. An endless chain equipped with a variable number of trippers passes underneath and raises and lowers each grate in turn in a wavelike manner, which conveys the product down to the discharge end and moves the bed of Disco so as to prevent firing.

After the 2½-hours cooling period, the Disco combines with the minus 2-in. wet-quenched product on a drag conveyor, where it is carried to a shaking screen and part of the 1x2-in. material is taken out for sale as "stove" size. The remainer is marketed as "furnace" product.

Distillation products leave the carbonizers at the upper, or feed, end and pass through a chamber where dust is collected over a water seal. The wet dust is removed with a drag

Storage conveyors on units 2 and 3 are revolving drums, and in the center can be seen screw conveyors that keep material in circulation at the upper end of one of the units. Screen conveyor entering from right brings feed from roaster, dropping it into the upward pitching screw which delivers it to the revolving drum. Material is withdrawn from drum by screw, the drive of which is in the center foreground.





Products of distillation leave carbonizers through large insulated duct at upper right center, pass over a water seal immediately below and, after spraying in wash box in a large chamber not visible, are exhausted to the holder through pipe in the upper right. Dust settles out of gas in water and is removed by drag in foreground.

conveyor and used as boiler fuel.

The coal gas then passes to a primary wash box, where, by water sprays, about 60 per cent of the tar is condensed. A scrubbing tower of standard design follows for further cooling and removal of tar. The gas temperature after leaving this cooling tower is 85 to 90 deg. F. Each unit has its own dust collector, condenser, and scrubber. The gas is exhausted by an ordinary centrifugal exhauster and passed to the burners through a 5,000-cu.ft. holder which regulates the gas pressure. Excess gas, amounting to 15 per cent, is wasted automatically.

Pressure on individual carbonizers is regulated by means of hand valves in the lines leading from the primary condensers to the scrubbers. Recording gages show what these pressures are. Actual pressure at the feed end of the carbonizer is kept as close to zero as possible.

Tar is drained periodically from the wash boxes, scrubbers and liquor tanks to settling tanks where liquor is decanted and recirculated. After settling, the tar is pumped to storage tanks for delivery to the tar plant. The liquor is cooled in a natural-draft cooling tower. No attempt is made to recover byproducts from the liquor.

Tar products are marketed as road tars, disinfectant oils, creosote oils and pitches of various melting points. Research and investigation on the characteristics and possible uses of the tar and oil products are made in a well-equipped laboratory. It is found that the tar has an exceptionally high tar-acid content. The tar plant is equipped with blending tanks, two steam stills for vacuum distillation, a pipe still and fractioning column. No attempt is made at present to recover the light oil, but future construction plans call for installation of a light-oil recovery plant.

The Disco plant operates continuously. Several times a year the entire plant is shut down to permit maintenance of the coal- and Disco-handling equipment. About every three months, the carbonizers—one at a time—are shut down for four or five days to clean out accumulated scale. Daily throughput is 325 tons of previously washed screenings or dust from Champion No. 1 preparation plant of the Pittsburgh Coal Co. The most desirable size of feed is minus 4-mesh. Feed analyzes 7.5 per cent ash and 37.0 per cent volatile matter. Disco ash runs from 9 to 10 per cent and volatile matter from 15 to 18 per cent.

Disco handles well, as is shown by high shatter index—from 70 to 74 per cent for plus 2-in. material. The product is dense, with an apparent specific gravity of 0.85 and is unusually uniform in cell structure throughout. It is highly reactive, ignites readily and burns with a smokeless flame and radiant heat. It is excellent for fireplaces and has found a ready market for household furnaces.

About 72 per cent of the coal treated emerges as a commercial solid fuel, or Disco. Tar yield is 16 gal. per ton of coal. Light oil, which is left in the gas at present, amounts to 2.5 gal. per ton of coal. The process yields from 4,000 to 5,000 cu.ft. of gas per ton of feed with a B.t.u. value of 475. Natural gas is used in pilot burners for starting the fires and in emergencies. Purchased power is used, mainly at 440 volts. Connected load is about 900 hp., with only 60 per cent of the machinery operating at any one time. Eleven men, including a foreman, operate the plant on each eight-hour shift.

Control room. In center are three instruments to furnish automatic control on hot gases for each of the three operating units. Readings from 45 thermocouples throughout plant are taken every 30 minutes by operative in this room, and ammeter readings on revolving units furnish operatives with information enabling them to control product.

Notes . . . FROM ACROSS THE SEA

IN BREAKERS and tipples when different classes of product have to be carried in opposing directions, both bands of a single belt are often used, one class of material traveling forward on the top band, the other backward on the bottom band. This trick now has been adopted at the coal face, according to *The Iron and Coal Trades Review* of London.

On a 900-ft. longwall face in the Britain Colliery, of the Butterley Co., Butterley, Derbyshire, England, some of the less desirable, or Tinker, coal, whenever clean coal simultaneously is being dislodged, goes on the top band to the tail gate at one end of the longwall face, and the clean coal is loaded on the bottom band to be transported to the conveyor on the main gate at the other end, though in the short period during which only the poorer coal is being dislodged that coal also is placed on the bottom band for transference to the conveyor running along the main gate.

The seam consists of an excellent top coal (Silkstone) 25 in. thick, 5 in. of dirt, 9 in. of less desirable coal (Tinker), another 5 in. of dirt and 14 in. of good bottom coal. A 5-ft. kerf is cut in the dirt parting under the Tinker bench.

In the first hour of every day shift, the miners apparently break down the Tinker coal so as to form notches in the longwall face, 6 ft. wide and 5 ft. deep, leaving "nogs," or short pillars, between the notches. The Tinker coal thus dislodged is placed on the bottom band of the conveyor and thus transported to the main gate.

After the first hour, the miners begin to load all the coal remaining in the cross-section, the Tinker coal on the upper band to go to the tail gate and the other two benches on the bottom band to go to the main gate. The lower of the two dirt partings already has been cut out and thrown into the gob, and the upper dirt parting, which usually falls when the Tinker bench is removed, goes there also.

Face and gate belts are 26 in. wide and handle 560 tons daily. The tail gate, as it handles only a part of the thin Tinker coal, has a short loading conveyor which feeds cars near the face. For the operation of these cars a track is laid in the tail gate. The gate conveyor is 1,260 ft. long and will have an ultimate length of 1,800 ft. Spacing of rollers on the face belt was made only 4½ ft. to keep the bottom band from touching the floor, with consequent wear, but this has proved to be a needless provision, and the rollers now are spaced at 8-ft. centers.

STEEL for roof support has made rapid headway in Great Britain, 38.9 per cent of its 14,425 miles of underground roadways being secured by steel arches, cambered girders, straight girders or steel bars. Scotland leads England and Wales, for Scotland has 44.70 per cent of its 1,879 miles of such roadways stiffened with steel and the southern kingdom only 38.01 per cent of its 12,546 miles thus equipped, according to the figures furnished by the Chief Inspector of Mines, F. H. Wynne, in a personal communication. The figures in detail are shown herewith. Nearly a half million steel props are being used at the face in Great Britain and much over a third of a million steel bars and straps.

The tendency toward such steel supports will grow in this country with increased depth and weight and wider roadways. Other factors will be the operation of several beds one above the other, thus weakening the rock structure, and the greater life of mines with increasing depth and more elaborate head facilities, because new shafts to shorten hauls will cost too much to pay for the shortened transportation thus effected.

HOISTING in skips of 10½-ton capacity is to be introduced at the new Comrie Colliery, of the Fife Coal Co., in Scotland, as soon as the 1,260-ft. shafts have been sunk. One shaft has a diameter of 22 ft. and the other of 20 ft. Diesel mine locomotives, air-turbo fans and 3.92-ton mine cars are other up-to-date features to be provided. Francois cementation methods are being used in sinking the shaft.

THERE is something in the coal fire that is fine, fine, fine, say the British, if one thus may revise Gilbert and Sullivan's lyric from "Patience." In tune with this dictum, Dr. Marie C. Stopes, at the Fourth National Coal Convention in London, postulated that: "Every home must have at least one open coal fireplace in use in the winter," adding that: "Everyone who constructs a nursery without an open-fire hearth is a criminal"—a sweeping criticism of our American practice, though she does not say so.

According to Dr. Stopes, the rays from a coal fire have a virtue that is not due alone to their wave length. Rays of certain wave frequencies have been found to have certain favorable or depressive effects on the human body; the red-hot heat of a fire or of a metal surface, for instance, has been found to be invigorating. Referring to her paper delivered in 1919 and included in the Philosophical Transactions of the Royal Society, Dr. Stopes declares that the vitrain layers in ordinary banded bituminous house coal will so affect a photographic plate in the dark as to imprint themselves on it as a clear image.

She designates these emanations as bio-vitric and queries, "Will the day come when these bio-vitric rays are simply identified with ultra-violet rays, or will their biologic value be disentangled and their nature shown to have varying properties that run through the alphabet as bio-vitric A, bio-vitric B, C, D, E, F, as do the vitamins today?" One can hardly view the rays from a fire, however, as being ultra-violet. They have not the short wave length of such rays. However, they give emanations of shorter and, apparently, more suitable length than those which come from a radiator or the radiant surfaces of a gas fire.

Whether the rays coming from coal have any superiority over those from other sources at similar temperatures still demands proof, though Dr. Stopes' personal experience of recovery from a long illness as a result of exposure to

SUPPORTS IN USE BELOW GROUND AT BRITISH COAL MINES, JUNE 30, 1937

(Omitting all districts with less than 100 miles of steel arches except in totals)

	Miles of Underground Roadway in Use						Steel Props, etc., Used at Face	
	Supported by							
District England and Wales	Steel Arches	Cambered Girders	Straight Girders, Bars, etc.	Timber, etc.	Unsupported	Total	Steel Props	Steel Bars or Straps
Northumberland	138	3	267	427	43	878	7,282	28,446
Durham	195	3	493	1,710	226	2,627	21,605	73,454
Lancashire and Cheshire	150	33	160	442	100	885	14,296	18,827
Yorkshire South	298	42	389	478	347	1,554	98,343	28,836
Nottinghamshire	101	24	184	221	280	810	87,645	65,715
Derbyshire, North	147	8	113	211	177	656	53,841	37,195
Staffordshire, North	148	33	30	70	10	291	9,395	4,164
S. Wales and Monmouth	813	1	31	1,014	459	2,318	78,166	20,047
Total	2,355	177	2,237	5,597	2,180	12,546	412,347	324,950
Per cent	18.77	1.41	17.83	44.61	17.38	100.00	.....	.....
Scotland								
Fife, Clackmannan, Kinross, Sutherland	176	3	53	65	50	347	35,497	16,548
Lothians (Mid. and East) and Peebles	126	4	33	122	30	315	19,845	10,784
Lanarkshire, West Lothian (Linlithgow), Stirling, Renfrew and Dumbarton	205	13	117	459	122	916	22,822	11,107
Total	553	22	265	814	225	1,879	85,867	41,470
Per cent	29.43	1.17	14.10	43.32	11.98	100.00	.....	.....
Great Britain	2,908	199	2,502	6,411	2,405	14,425	498,214	366,420
Per cent	20.16	1.38	17.35	44.44	16.67	100.00	.....	.....

the direct wholly unshielded rays of a coal fire, with increased vitality, sense of suddenly returning health, steadying pulse, lowered temperature and an improvement in the feel and appearance of the skin, repeated many times with less serious ailments, convinces her that complete exposure to the heat from a coal fire is a specific for many bodily ills. J. G. Bennett, director, British Coal Utilization Research Association, instanced the recovery of a relative after an exposure to the rays from a coal fire. Lord Horder had declared, he added, that the rays acted on the nervous system, relaxing the tensions of the muscles. All neurologists that Captain Bennett had consulted had held a similar opinion.

The fire should not be deep from front to back but should be high from top to bottom, should have a backing of firebrick that will throw the heat into the room and should stand 12 in. above the hearthstone, declares Dr. Stopes. American open coal fires (if any still remain) do not follow any such specifications. The British fires more nearly comply with them.

With central heating, the rooms are better heated than with an open fire but the effect of high-temperature radiance is lacking. Too often American furnaces are so large that the radiant heat is partly lost because it cannot reach adequately the water surfaces that surround the fire, just as the heat in an open fire that is too deep from front to back cannot reach the room but passes off up the chimney as convective heat.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.

Coal-Mine Fires of Electrical Origin: Their Cause and Prevention, by E. J. Gleim, U. S. Bureau of Mines. I. C. 6981, 17 pp.; mimeograph.

Twelve electrical fire hazards and fourteen instances of electrical mine fires are described in the circular, which, among other matters, points out that anthracite, though it ignites at a higher temperature than bituminous coal, is more likely to be ignited electrically, because anthracite is more conductive than soft coal and thus draws a heavier current. Incidentally, it points out that acid water is more conductive than fresh water and may make brattice cloth and wood quite disposed to carry current. It warns that "chlorinated hydrocarbons" used as dielectrics in transformers liberate relatively large quantities of hydrochloric acid and carbon monoxide when the liquids are decomposed on hot iron surfaces or when an electric arc is formed by a short circuit in the transformer. Care, therefore, must be taken.

Mineral Valuations of the Future, by C. K. Leith. American Institute of Mining and Metallurgical Engineers, New York. 116 pp., 5¼x8¼ in.; cloth. Price $1.50 to non-members; $1 to members.

Mineral values are not mere estimates of quantities of mineral but the amounts the purchaser is willing to give for them and the seller is willing to accept for parting with them. Many public policies, whether the owner or appraiser likes them or not, are affecting mineral values, such as economic nationalism, naturalization of minerals, conservation measures, differential taxation and regulations as to competition and monopoly. Other causes of variance in values are deceleration or reduced acceleration of consumption, scarcity of minerals and advances in technology.

Among other matters discussed in this product of the Seeley W. Mudd Memorial Fund are significance of mineral values, methods of mineral valuation, tonnage of quantity estimates, future annual production, the time element (life and deferment), cost, selling prices, profit, rate of return and future of mining values.

Manual of Smoke and Boiler Ordinances and Requirements. Smoke Prevention Association, City Hall Square Building, Chicago. 152 pp., 6x9 in.; paper. Price, 50c.

Published in the interest of smoke and air-pollution regulation and fuel combustion, this publication describes methods of measuring air pollution, shows tonnages burned, in some cities, of anthracite, bituminous and semi-bituminous, lists smoke-prevention authorities and gives information as to regulatory methods, regulations and causes for smoke. The last half of the book covers the 1937 convention in New York City.

Statistical Year Book of the World Power Conference. Central Office of the World Power Conference, 36 Kingsway, London. Vol. I, 111 pp; Vol. 2, 132 pp.; 8¾x11¼ in.; cloth. Price of each volume, $4.86 net.

An effort made on behalf of the World Power Conference to collect annually statistics of solid, liquid and gaseous fuels, water power and electricity has resulted in two volumes, one containing data for 1933 and 1934, and the second for 1934 and 1935. These volumes probably contain the most reliable data on coal, brown coal, lignite, peat and wood resources available. Statistics cover also production of coal, coke, wood, petroleum, benzol, alcohol, natural and manufactured gas, water-power resources and development, and give much detail regarding electrical power and distribution.

High-Speed Cameras for Measuring the Rate of Detonation in Solid Explosives, by W. Payman, W. C. F. Shepherd and D. W. Woodhead, Safety in Mines Research Board. Paper No. 99, 22 pp. with 5 plates. British Library of Information, New York City. Paper. Price, 65c.

One of these equipments is an "internal-drum camera" and it uses a high-speed revolving drum with a film on the inside of the rim so that the centrifugal force instead of tearing the film presses it against the machined inner face of the rim. The other is a "rotating-mirror camera" in which the film is stationary.

Determination of the Effect of Oxides of Sodium, Calcium and Magnesium on Ash Fusion Temperatures by Use of Synthetic Coal Ash, by T. G. Estep, H. Seltz and W. J. Osborn, Carnegie Institute of Technology. Bulletin 74, 14 pp.; paper. Price, 25c.

Fusion temperatures of natural ash can be duplicated by synthetic ash. Each per cent of Na_2O reduces fusion temperature 50 deg. F. Up to 5 per cent of CaO the temperature of fusion is reduced 50 deg. F. for each per cent of the oxide, but beyond that percentage the fusion temperature may be less adversely affected and may even be increased by the addition of CaO. The action of MgO up to 10 per cent is identical with that of CaO up to 10 per cent of this oxide and can be summed with the CaO in any method of plotting.

Fuel for Permissible Flame Safety Lamps, by A. B. Hooker and E. J. Coggeshall, U. S. Bureau of Mines. R. I. 3389, 5 pp.; mimeograph.

Ordinary motor gasolines, though generally used for that purpose, give unsatisfactory service in permissible flame safety lamps. In this report, four specific oils receive the Bureau's recommendation. Such oils should form a minimum of gum to clog cotton, wick and fuel fount. In use the wicks should continue so gum-free that they can be used without replacement for a whole year. The oil should furnish light for twelve hours with a normal—usually a 1-in.—flame, be ignited readily in a cold lamp by the reigniting device, should not corrode the lamp, thus making salts to clog the wick, or make a smoky flame. The range of temperature over which such an oil will distill should be 200 deg. F. With a higher range the light is reduced, and the wick gums; with less, the vapor is less readily ignitable. Even recommended oils should not be kept in stock more than a month or be exposed to sunlight with its gumming effects.

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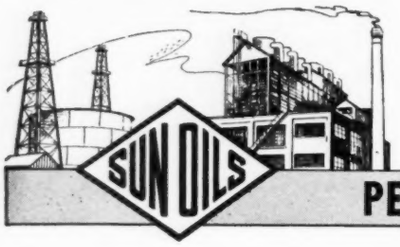

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OPERATING IDEAS

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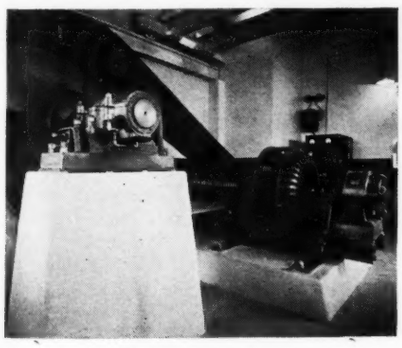
Production, Electrical and Mechanical Men

Six-Cylinder Engine Used In Auxiliary Fan Drive

As an auxiliary drive on the main ventilating fan at its Kramer mine, Stump Creek, Pa., the Northwestern Mining & Exchange Co. has installed a gasoline engine to supplement the regular electric motor. The fan is located on a 12x12-ft. airshaft 351 ft. deep, and the main drive is a 250-hp. synchronous motor (2,300 volts, 600 r.p.m.) fitted with a 19-in.-diameter pulley. Twenty-one V-belts run from this pulley to the 72-in. pulley on the fan shaft. Fan speed is 156 r.p.m., producing 300,000 c.f.m. at a water gage of 3.6 in.

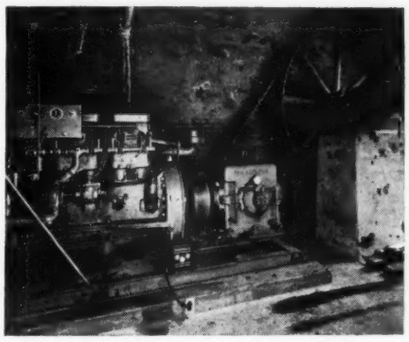
The auxiliary drive, to be used in case of emergency or when it is necessary to



Main fan drive.

shut down the main electric drive, consists of a six-cylinder 1,200-r.p.m. Wisconsin engine connected to a Philadelphia speed reducer (2.1:1), on which is mounted a 22-in.-diameter pulley. From this pulley twelve Gates V-belts extend to a 90-in. flat pulley. With this drive, maximum fan speed is 136 r.p.m., delivering 260,000 c.f.m. at a water gage of 2.6 in.

The connection to the fan shaft is made by means of a hollow shaft with an outside diameter of 7½ in. and an inside diameter of 6¼ in., through which is run a 4 15/16-in.-diameter solid shaft. The 90-in. pulley is keyed to the hollow shaft. The solid shaft is connected to the fan shaft by a flexible coupling and to the hollow shaft at the other end by a Hilliard overrunning clutch. By this arrangement the auxiliary drive is disconnected from the fan shaft when the main drive is in operation. Contrariwise, the auxiliary drive picks up the load when the fan is in motion and power is cut off the motor in the main drive. This arrangement also allows the main drive motor to be started and pick up the load while the auxiliary drive is in operation.



New auxiliary fan drive.

The installation of the auxiliary drive was completed in February, 1938, and it has operated satisfactorily since that time. The practice is to start up the auxiliary once a week and run it for a short time under full load to make sure that it will be in operating condition should it be called upon in an emergency.

Kramer ventilating unit, with the main drive at the right and the auxiliary at the left

Selecting the Right Machine Saves Operating Dollars

With so many fixed factors in the cost of coal, mining men necessarily are spurred to a higher degree of efficiency in order to take advantage of opportunities in departments where there is a possibility of reducing the outgo, writes E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky. For example, it is easy to save money or lose money—depending upon the choice—in the selection of a mining machine. "It is not always easy to choose the proper coal cutter for the conditions, as we sometimes do not know what the conditions are when we see them. Quite frequently, also, conditions will change during the life of even a small mining property, and an exchange of mining machines may be highly justified. This sort of thing happens to us even in our own highly prized Elkhorn coal field.

"The shortwall cut usually is made at the bottom of the seam. However, it is not impracticable to make the cut up in the coal, the only requirement being to leave the lower bench back a few feet as a rest for the machine. The low-vein shortwall is a cost-cutting and a many-purpose instrument. It is one that saves in operating cost and possible yardage. At our No. 4 mine we used many shortwall units. Our coal was 44 in. thick, with an additional bench of laminated coal at the bottom some 6 in. thick. The cut was made at the top of this laminated bench of refuse coal in all rooms, pillars and entries, with the exception of haulage entries. So the bottom bench was left intact at a saving in cost. Also, the extra clean coal floor was a favorable element in face preparation. This one plan of taking advantage of conditions with our shortwall machines saved us many dollars in production cost every day of operation since 1919.

"We took advantage of the characteristics of this machine to cut our places wide; so wide, in fact, that all gob material could be placed on one side of the track opposite the robbing side. Thus, the pillar side was left clear. Each cut was designed to give a certain number of man-shifts of work to clean it up. The rather wide faces gave a good yield of block coal because fewer corner shots

were necessary per ton. All this was only a matter of using the right machine to get the right results.

"At our No. 5 mine, we beat the devil around the bush—and with a big knot maul—because we did not depend upon good-luck emblems to increase our efficiency. We were cutting at the top of a bench of cannel coal with shortwall machines. This cannel bench, some 22 to 24 in. thick, was at the bottom of the seam, which had an average over-all thickness of some 50 in. Top conditions were favorable for shortwall cutting for a while only. As a result of the change, shooting at the top after the shortwalls began to shock and bring down 30 in. of the immediate overburden, and the handling of this bulk of top became too expensive. Consequently, we went to track-mounted top cutters. Thereafter, a good coal top was made, which did not sweat to a troublesome extent, in addition to giving us a chance to get cleaner coal and save the handling of the 30 in. of overburden. It is estimated that this change in cutting equipment paid for itself in ten months and that it returned its cost some ten or twelve times in the past ten years. In other words, the machine was right for the task."

Non-Explosive Solution Used In Removing Grease

Using gasoline for removing grease from machine parts, the common practice in maintenance work at numerous coal mines, is recognized as a fire hazard to men and property. At the six operations constituting the Powellton (W.Va.) division of the Koppers Coal Co., C. R. Stahl, division manager, has taken steps to eliminate the use of gasoline for cleaning. After a thorough test of a cold hydrodegreasing fluid in the central shop at Powellton use of the liquid is being extended to the mine shops.

The concentrated fluid, trade-named "Gunk," is diluted for use in the proportions of 5 gal. of kerosene to 1 gal. of Gunk. Small machine parts are dipped or soaked in this solution of kerosene and Gunk, but in cleaning large assemblies the solution is applied with a large paint brush. The final step is to wash the part with water. No heating is necessary and therefore, if convenient, this washing can be done by pouring on hydrant water from a hose. Neither is it necessary to have force; a gentle stream suffices.

Fig. 1—Painting the greasy surfaces with the cleaning solution.

The series of three illustrations herewith, which were made at the Powellton shop, illustrate a cleaning job on a mining-machine housing. In Fig. 1, John E. Miles, engineering assistant, is demonstrating wiping greasy surfaces with a brush that has been dipped in the pail of Gunk solution. The graceful parabolic curve of the stream of water from a hose, Fig. 2, bears out the fact that water force is not a requirement. The finished job is shown in Fig. 3. As also would be the case if cleaning with gasoline, the thick, solid accumulations of greasy dirt should be loosened with a stick to eliminate the necessity for prolonged soaking.

Fig. 2—The grease has been made water-soluble, so the part is washed with cold water.

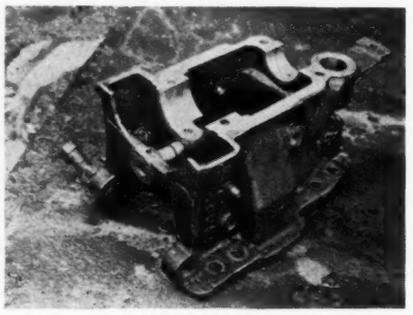


Fig. 3—Bright steel surfaces may be so thoroughly rid of grease that rusting will take place if they are not reoiled.

Action of the cleaning fluid is to convert the oil and grease into a water-soluble state. Apparently the solution has no more effect on the hands than would be expected from kerosene or gasoline; at least this has been the observation at Powellton. An odor indicating a phenol base or content results in the assumption that probably there is an antiseptic effect. The kerosene mixture will burn if sufficiently heated and will burn at the end of a wick, but a fire involving it will be put out by a stream of water instead of being spread, as is usually the case when water is thrown upon a gasoline fire. The Gunk being used at Powellton, a product of the Curran Corporation, Somerville, Mass., was purchased in 5-gal. lots from the Baldwin Supply Co., Charleston, W. Va., at a cost on the order of $1.50 per gallon.

Soup to Nuts

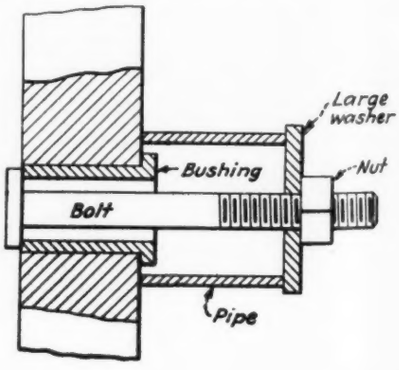
• "Soup to nuts," in the usual lingo, means a full-course meal with all the trimmings. In somewhat similar fashion, the Operating Ideas department of Coal Age attempts to present a selected list of articles dealing with all the problems confronting operating, electrical, mechanical and safety men in the coal-mining industry. All these men are forced to tackle a new problem from time to time, and Coal Age gives you the answers. So if you have licked one yourself, here is the place to tell how you did it. Send in the details, along with a sketch or photograph if it will help to make them clearer. You will help out some other man and at the same time benefit yourself, for Coal Age pays $5 or more for each idea it finds acceptable.

Stubborn Bushings Removed With Bolt and Pipe

Declaring that it will start the most stubborn bushing, John E. Hyler, Peoria, Ill., offers the arrangement shown in the accompanying sketch. One of the parts consists of a heavy bolt with an effective length of twice to three times that of the bushing. The head of this bolt must engage firmly the small end of the bushing so that it will not be pulled into it. On the other hand, the bolt head must not be large enough to overlap onto the machine part. Large-headed bolts, of course, may be reduced by grinding.

The threaded end of the bolt is passed through a large washer which rests against one end of a short piece of pipe forming a thimble around the bushing, as shown. Very often, a short nipple can be found which will serve the pur-

Showing diagrammatically how the bushing is pulled from its seat.



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pose. With the bolt, washer and nut assembled as in the sketch, tightening the nut will bring the bushing out of its seat.

If desired, the various parts may be made into a permanent tool simply by welding the washer to the piece of pipe, thus forming a cup with a hole in the bottom of it through which the bolt may be run and held in place by the nut. If made up as a permanent tool, it will be wise to have the pipe long enough to remove the longest bushing in service. Various bolts with different sizes of heads can be used for different sizes or diameters of bushings, or washers of various diameters may be used under the same bolt head.

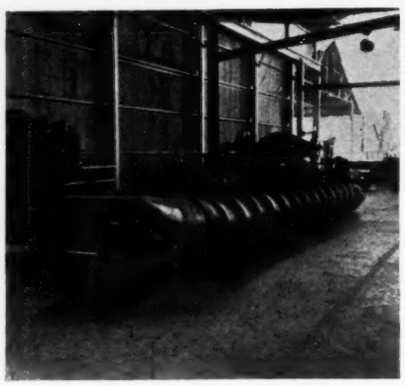
Flexible Coal Chute Made By Welding Methods

Simple design and easy construction are noted as features of the flexible coal chute shown in the accompanying illustrations, which Ira B. Yates, Wilson Welder & Metals, Inc., who supplies the details, states was made for a coal company by a Louisiana steel-fabricating shop. When attached to the hopper which it was designed to fit, the chute distributes coal as desired over a considerable area.

Construction details are indicated in the accompanying sketch. The chute comprises fifteen conical sections held in proper position by chains on opposite sides. Sections are anchored in position by bolts passing through pairs of angle clips welded to the upper edges of the sections and then through links in the chains. Sections making up the flexible part of the chute were cut from ¼-in. steel plate by an oxyacetylene cutting machine. These sections then were rolled to the proper contour and arc-welded from both sides.

Sections are 30 in. long. Bottom diameter is 30 in.; top diameter, 36 in. Each of the fifteen sections extended 9 in. into the one below it, making the total length of the flexible part of the chute 27 ft. The upper member changes from a conical to a square section to fit the 42-in. square mounting on the hopper.

Construction details, complete chute and also the chute sections.

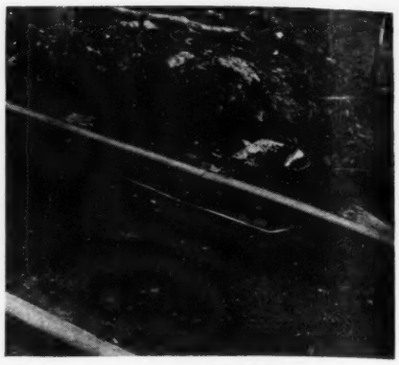


Completed chute laid out on the fabricator's floor.

Nuts Used for Terminals On Arc-Weld Bond

Tracks at the Fort Hartford mine of the Fort Hartford Coal Co., Tishenor, Ky., are bonded with an arc-weld bond equipped with common steel nuts for terminals. The bond was developed by Connis Hall, general manage·, and is made of scrap soft-drawn copper in the 4/0 size, such as machine wire, etc. The copper is threaded on the ends, and then two ½-in. nuts are run on each end and locked together to form the terminals, after which the end of the rod is upset, or hammered to make the contact as tight as possible. Cost of the nuts is about 6c. per pound when bought in bulk, and a complete bond represents an outlay of about 20c., materials and labor. The bond is applied in the usual manner with a resistance welder.

Showing how two ordinary nuts are threaded on the end of 4/0 copper to form the bond terminals.

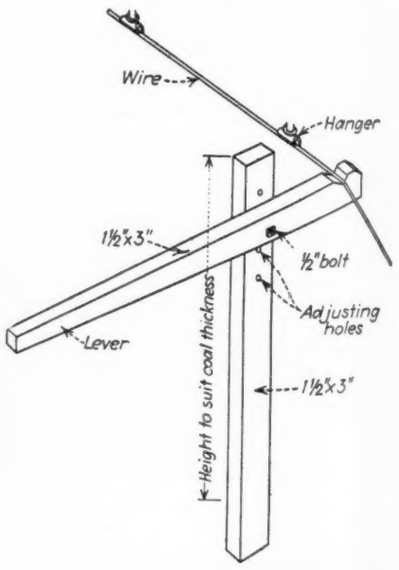


Fort Hartford bond in service on the 60-lb. outside haul.

Post and Lever Help In Hanging Wire

A simple jack made up of a post and lever is offered by John Gross, New Philadelphia, Ohio, as an aid in hanging trolley wire. As shown in the sketch, both post and lever are made of 1½x3-in. pine. The lever has a hole in it about 12 in. from one end to take a ½-in. bolt. This bolt holds the lever to the post, which is bored with several holes to make it possible to adjust the height of the

Showing how jack is used to raise wire into the hangars.



A Message to Eastern and Mid-Western Bituminous Fields

WHEAT Pioneers Again, with:

Centralized Sales and Service Devoted Wholly to Wheat Electric Cap Lamps

New Policy Places Eastern and mid-Western Bituminous Fields under A. C. Dick and trained staff handling Wheat Lamps exclusively.

Wheat is pioneering again.

Effective February 1, 1939, the Sales Promotion and Service of Wheat Electric Cap Lamps in the Eastern and mid-Western Bituminous fields will be under the direct personal supervision of A. C. Dick and a trained staff handling Wheat products exclusively.

This new policy establishes for the first time in mine lighting history a centralized sales and service devoted wholly to the electric cap lamps of one manufacturer and entirely without any other interests.

This policy is another example of Wheat pioneering. Wheat was first with constant potential — brighter light that does not fade; Wheat was first with the cap lamp which can be charged without removing the battery cover; Wheat was first with the emergency bulb; Wheat was first with a 4-volt battery; Wheat was first in self service lamphouse equipment.

And now Wheat is first with centralized Sales Promotion and Service devoted wholly to Wheat Lamps and entirely without other sales or service interests.

Sales Promotion and Service in the Eastern and mid-Western Bituminous Fields will be under the direct supervision of Mr. A. C. Dick and a trained staff of assistants, with headquarters in Pittsburgh and other offices strategically located in important mining centers.

This change, the first of its kind in mine lighting, will serve to bring Wheat users and friends into more immediate contact with new Wheat developments which will be introduced during 1939.

WHEAT

The Lamp for Productivity with Safety

ELECTRIC CAP LAMPS

KOEHLER MANUFACTURING CO., MARLBORO, MASS.

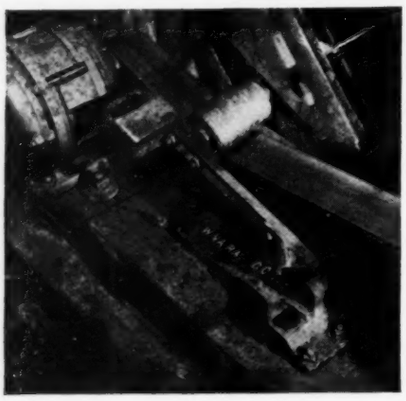
A. C. Dick, 207 Investment Building, 239 Fourth Ave., Pittsburgh, Pa.

E. D. Bullard Company, San Francisco, California
H. C. Burton & Company, Hamilton, Toronto, Montreal, Swastika, Canada
Oldham & Son, Ltd., Denton, Manchester, England

lever to the work. Post length is governed by the height of the roof, and a notch is cut in the lever, as indicated, to take the wire. Using the jack, says Mr. Gross, "we are able to hang more wire with two men than we could with three before—and with less effort."

Switch Throw Makes Idler At Standard Mine

Pressed into service in an emergency eight years ago, a switch throw served so well as base, arm and weight for a belt idler pulley that it still is on that duty in the tipple of the Standard Coal Co., Wheatland, Ind. The motor available for driving the dewatering screen was of speed too high to permit use of a pulley with a large enough diameter for proper belt contact. An idler was the immedi-



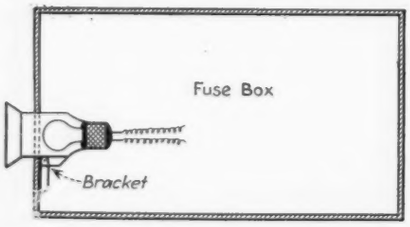
Built for haulage but used in power transmission.

ate solution and the mechanic hit upon the switch throw as the means of mounting the pulley. The handle weight happened to be just right for the duty. The idler bearing has been renewed but the switch lever bearing still is in good shape, although it is oiled only occasionally by a few drops of lubricant at the ends.

Cutting-Machine Operation Aided by Headlight

To facilitate the work of the operators of Goodman shortwall cutters at the mines of the Knox Consolidated Coal Corporation, headlights are installed in the fuse boxes, states Walter Pickel, Bicknell, Ind. These fuse boxes, not now in use, are on the left side of the machines.

A tilting bracket permits adjusting the cutter headlight, which is installed in the fuse box.

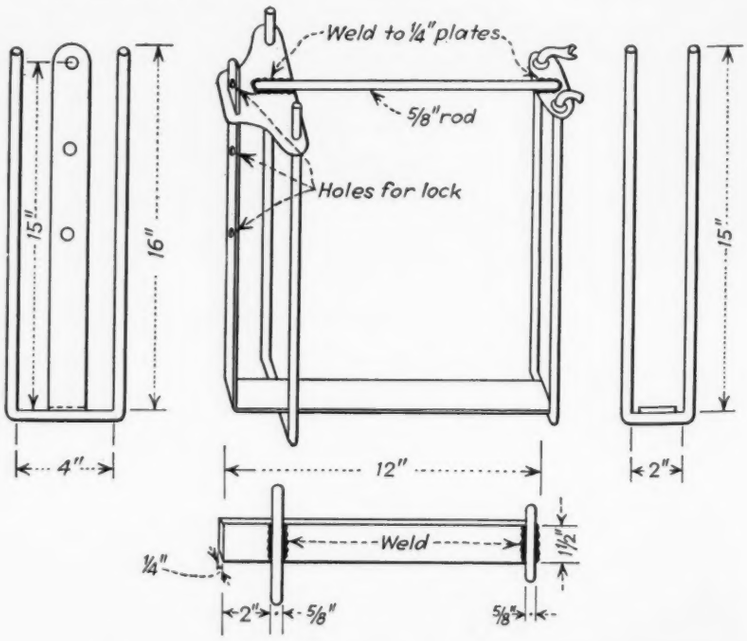


A light is made of a 7-in. length of 3-in. pipe, which is belled out at one end and drawn down at the other small enough to hold a socket. To install a light, a hole 4 in. in diameter is cut in the fuse box next to the cutter box, and the light is placed in the center of the hole, using a bracket, so that it can be tilted up when the machine is on the road and down when it is cutting. The tilting bracket is made of two pieces of $\frac{3}{8}$x1-in. steel. Holes $\frac{3}{8}$ in. in diameter are drilled in one end of each member, through which a $\frac{3}{8}$-in. bolt with a thin nut and a lock washer is passed to give a hinge action.

Holder Takes Ten Picks And Can Be Locked

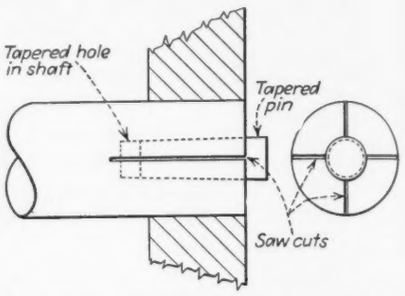
Ten picks can be locked in the holder shown in the accompanying illustration, according to word from Harley W. Fielder, Knox Consolidated Coal Corporation, Bicknell, Ind. The holder also is adjustable for less than ten picks, and was designed to meet the conditions growing out of complete mechanical loading, under which unit bosses had difficulty in keeping their picks in condition and also preventing their loss. Picks were delivered in the evening, and the night crews used them all, with the result that only dull ones were left for the day crews. Now, each unit boss has two sets of holders and two sets of picks. One set is sharpened while the other is being used. The blacksmith and the unit boss on each section each have a key and the holders are fitted with locks in the same series so that one key will fit both locks. With the holders, no pick trouble is encountered, either from losing them or having them used at the wrong time.

Adjustable to hold any number of picks up to ten, the holder is fabricated by welding.



Expand Shaft to Fit Hole With Tapered Pin

It frequently is necessary to fit a shaft very tightly in an existing hole when facilities are not available for producing a shrink fit or where for some reason a shrink fit is not advisable. Where these conditions prevail, writes John E. Hyler, Peoria, Ill., it sometimes is possible to use the method shown in the accompanying sketch. First, a center hole is drilled in the end of the shaft and this hole is taper reamed. After



A hole in the end of the shaft accommodates a tapered pin, which expands the shaft when it is driven home.

drilling and reaming, two saw cuts somewhat deeper than the hole are made across the end of the shaft. These cuts, as indicated, are at right angles, and divide the end of the shaft into four sectors. A pin then is turned to the same degree of taper as the hole and enough larger so that it will have to be driven a short distance with a sledge. Obviously, this expands the shaft to a tight fit in the hole. If desired, the pin may be coated lightly with a good iron cement, which will add to the expansive effect when the pin is driven home.

CLEANER BOILERS WITH HALF THE OIL
● WET STEAM and the high mineral content of the boiler water made lubrication of the steam engine in a Missouri power plant a real test for any oil. In addition oil carry-over made it necessary to skim the boilers daily.
After replacing the valves and piston and reboring the cylinder on this engine, a test was made of various oils. Could one be found that would reduce consumption and oil carry-over to the boilers and, at the same time, give adequate lubrication?
When StanoCyl W was tried, it was found that oil feeds could be cut to nine drops per minute—just *half* the former oil consumption. This small amount of StanoCyl provided ample lubrication, and practically eliminated oil carry-over and boiler trouble.
There's a grade of StanoCyl for every steam condition. StanoCyl W for wet steam, StanoCyl D for dry steam, and SH for superheated steam. Let a Standard Lubrication Engineer test the right grade in your engine. It costs you nothing and it may show you how to save up to *half* of your present oil consumption.
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WORD FROM THE FIELD

Operators Name Committee To Negotiate Scale

A committee of sixteen to meet with United Mine Workers officials to negotiate a new Appalachian wage contract has been appointed by the operators. With the existing contract scheduled to expire on March 31, the committee will meet soon to formulate plans for the parleys, which will be held in New York City.

The committee includes the following: Central Pennsylvania District—Charles O'Neill, president, United Eastern Coal Sales Corporation, and A. J. Musser, vice-president, Clearfield Bituminous Coal Corporation; Western Pennsylvania—J. D. A. Morrow, president, Pittsburgh Coal Co., and W. L. Affelder, vice-president, Hillman Coal & Coke Co.; alternates, R. E. Jamison, vice-president, Jamison Coal Corporation, and James Patterson; Northern West Virginia—Charles Dorrance, vice-president, Consolidation Coal Co., and Alexander Grant, general manager, Kelleys Creek Colliery Co.; alternates, Samuel Pursglove, general manager, Pursglove Coal Mining Co., and William Findlay, general superintendent, Simpson Creek Collieries Co.; Southern High-Volatile—L. E. Woods, president, Crystal Block Coal & Coke Co.; W. J. Cunningham, president, Crummies Creek Coal Co.; Holmes Morton, president, Winifrede Collieries Co.; L. C. Gunter, president, Southern Appalachian Coal Operators' Association; alternates, J. D. Francis, president, Island Creek Coal Co.; G. H. Esser, secretary, Virginia Coal Operators' Association; Harry LaViers, vice-president, South-East Coal Co.; Frank M. Medaris, general manager, Harvey Coal Corporation; Southern Low-Volatile—P. C. Thomas, vice-president, Koppers Coal Co.; O. L. Alexander, president, Pocahontas Fuel Co.; J. W. Carter, president, Carter Coal Co.; L. T. Putman, general superintendent, Raleigh-Wyoming Mining Co.; alternates, Edward Graff, vice-president, New River Co., and P. C. Graney, Koppers Coal Co.; Ohio—W. L. Robison, president, Youghiogheny & Ohio Coal Co., and R. L. Ireland, Jr., president, Hanna Coal Co.

The U.M.W. policy committee, headed by John L. Lewis, union president, will meet March 9 in New York to prepare its demands to be presented at the joint parley. In this connection, the *United Mine Workers Journal* of Feb. 15 states: "In the scale resolution by the 1938 international convention for the bituminous industry there are these two provisions:

" 'The wage scale committee is empowered, through the medium of a national, Appalachian, or other proper joint conference, to negotiate the best contract obtainable."

" 'Every effort shall be put forth to establish a uniform six-hour day and 30-hour, five-day week.' "

During the month of January, U.M.W. members were assessed $1 each in addition to the regular monthly dues of $1.50.

Bombers Ask Rehearing

Petition for a rehearing before the U. S. Circuit Court of Appeals in the Springfield (Ill.) mine bombing case wherein 34 members of the Progressive Miners were convicted of conspiracy charges and the conviction was upheld by the appellate tribunal has been filed in Chicago by defense counsel. The appeals court reduced the original sentence of four years in prison and $20,000 in fines on three conspiracy charge convictions to two years and $10,000 (*Coal Age*, February, p. 94). Defense attorneys are seeking to have the penalties further reduced to one year and $5,000.

Keeping Step With Coal Demand

Bituminous Production

Week Ended	1939 (1,000 Tons)	1938* (1,000 Tons)
January 7	7,648	6,115
January 14	8,030	7,605
January 21	8,170	7,316
January 28	8,563	7,791
February 4	8,075	7,709
Total to Feb. 4	40,416	36,536
Month of January	35,530	30,950

Anthracite Production

January 7	915	824
January 14	990	1,263
January 21	1,176	1,327
January 28	1,311	1,199
February 4	1,208	1,129
Total to Feb. 4	5,698	5,669
Month of January	4,959	4,815

* Outputs of these two columns are for the weeks corresponding to those in 1939, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

	(Thousands of Net Tons) Jan. 1 1939	Dec. 1 1938	Jan. 1 1938
Electric power utilities	8,304	8,413	9,075
Byproduct coke ovens	7,462	7,173	7,273
Steel and rolling mills	677	650	1,109
Railroads (Class 1)	5,629	5,311	7,573
Other industrials*	11,377	11,770	14,144
Total	33,449	33,317	39,174

Bituminous Coal Consumption

	(Thousands of Net Tons) Dec. 1938	Nov. 1938	Dec. 1937
Electric power utilities	3,666	3,530	3,577
Byproduct coke ovens	4,742	4,622	4,014
Steel and rolling mills	836	803	783
Railroads (Class 1)	7,022	6,604	7,352
Other industrials*	10,103	9,369	10,698
Total	26,369	24,928	26,424

* Includes coal-gas retorts and cement mills.

High Court Sustains TVA In Utilities Suit

The suit by fourteen Southern utility companies against the Tennessee Valley Authority electric power program was dismissed in a five-to-two decision by the Supreme Court of the United States on Jan. 30. The court held that the corporations were without legal justification for maintaining their suit and have no right to be free of competition.

The decision, read by Justice Roberts, did not pass upon the constitutionality of the TVA act or the authority's operations but concentrated on the point that the utilities could not show illegal competition and damages as a result of TVA activities. The court based its rejection of the companies' attack on the following grounds:

1—The utilities hold no monopoly on sale and distribution of power, hence competition, whether by the Government or another private utility, is legal.

2—TVA operations do not constitute a form of illegal federal regulation of local utilities.

3—Sale of Government property in competition with others does not violate the Constitution.

4—TVA did not engage in illegal coercion, duress. fraud or misrepresentation.

Justices Butler and McReynolds dissented, the former declaring that the companies were "entitled to have this court decide upon the constitutional questions they have brought here."

The Supreme Court ruling upheld the decision of the U. S. Court for the Eastern District of Tennessee, which on Jan. 21, 1938, held that "these complainants have no immunity from lawful competition even if their business be curtailed or destroyed" (*Coal Age*, March, 1938, p. 79).

TVA agreed on Feb. 4 to purchase for $78,600,000 the electric power properties of the Tennessee Electric Power Co., controlled by the Commonwealth Southern Corporation.

Would Amend Labor Act

Revision of the National Labor Relations Act is sought in two series of amendments introduced in the Senate at Washington by Senator David I. Walsh (D.) of Massachusetts and by Senator Edward R. Burke (D.) of Nebraska. The Walsh proposals, which have been approved by the American Federation of Labor, were presented late in January, and the Burke amendments were introduced during the second week in February. Though there are a number of similarities between the two sets of proposed changes, the Nebraska Senator's revisions are much more sweeping.

Drastic curtailment of the present pow-

ers of the National Labor Relations Board, which administers the act, is sought by the Burke measure. He seeks to separate the Board's powers of investigation and prosecution of unfair practices and its function as judge in the same cases. One of the major changes proposed is to re-create a board of only three members composed of one labor representative, one for the employers and one for the public. The purpose of this is to do away with what Senator Burke terms a board of "organized labor partisans."

Pennsylvania Fights Rise In Hard-Coal Rates

A Federal Court order for an injunction against higher freight rates on anthracite shipped within the borders of Pennsylvania, which were ordered to go into effect on Feb. 10 by the Interstate Commerce Commission, will be sought by the State. Governor Arthur H. James directed Attorney General Claude T. Reno on Jan. 31 to support the State Public Utility Commission's fight against the federal commission's proposed rate boost, announced late in November (*Coal Age*, January, p. 72).

The appeal, said Mr. Reno, will be based on the contention that the hard-coal industry is wholly contained in Pennsylvania and that the I.C.C. order amounted to "discrimination against the Commonwealth." The proposed action by the State in seeking to override the jurisdiction of the federal commission on an issue affecting intrastate railroad regulations was described by the State Attorney General as "unprecedented."

The P.U.C. asked a 30-day stay in the effective date of the rate boost while it prepared its appeal to the court, but the I.C.C. denied the request.

Open-Price Plan Scrapped

Pennsylvania anthracite operators have scrapped the open-price filing agreement following the withdrawal of signatories to the pact late in January. The arrangement with the management engineering firm of Stevenson, Jordan & Harrison, which administered the agreement, was terminated as of Feb. 15. In place of the price-posting scheme a plan for regional conferences to discuss production and marketing problems has been adopted. Under the latter arrangement, producers in the Northern field will hold stated meetings in Scranton, while the other operators will convene in Pottsville.

Anthracite Collieries Leased

The Nesquehoning colliery of the Lehigh Navigation Coal Co., Nesquehoning, Pa., was leased to the Edison Anthracite Co., Scranton, a subsidiary of the Temple Coal Co., as of Feb. 16. The colliery formerly employed 1,200 men.

The Hammond colliery of the Philadelphia & Reading Coal & Iron Co., Girardville, Pa., has been leased by Robert J. Birtley, vice-president of the Centralia Collieries Co. A new organization, known as the Hammond Coal Co., has been set up and a contract for a new steel breaker has been let.

Operators Demand Revision of Coal Act; Law Upheld in Court Actions

WASHINGTON, D. C., Feb. 20—Though the National Bituminous Coal Act and the Coal Commission emerged victorious in court actions against the constitutionality of the law brought by the city of Atlanta, Ga., and to enjoin the disclosure of cost data by the Commission, sought by the Utah Fuel Co. et al, another ominous conflict looms. The new obstacle came with the announcement on Feb. 10 that 35 operators representing many of the largest companies in the industry sought action by Congress for drastic revision of the Guffey-Vinson act. The producer representatives, having organized a Committee for Amendment of the Coal Act, issued the following statement:

"The primary objective of the coal act creating the National Bituminous Coal Commission was to effectuate a stabilization of prices and at a price level that would permit the industry to recover and prosper. Nearly two years have now elapsed. The objective sought has not been attained despite the fullest cooperation of the industry and huge expenditures of time and money. On the contrary, the conditions within the industry have gone from bad to worse and are approaching a desperately serious crisis.

"We have reluctantly come to the conclusion that the objective sought is impossible of practical attainment under the price-fixing arrangement which the coal act projected. Our experiences in the price-fixing efforts to date lead us to conclude that it does not lie within the capacity of the present federal commission or any commission to evolve and maintain a price system that will be equitable to all concerned and be workable and afford profitable operation for the entire industry, to say nothing of the legal questions which are still implicit in this situation.

"It is very much more than a question of at what undeterminate future date the Commission will arrive at the point of promulgation of minimum price schedules and what these prices may be. There can be no assurance that such schedules will stick, no assurance that they will materially relieve existing difficulties, and every prospect that their promulgation will precipitate new and protracted and disruptive litigation.

"We are convinced that prompt action should now be taken, at the earliest possible moment, to modify the coal act in important particulars so as to permit a different approach to the goal of stabilization of the industry through a large measure of cooperative self-determination. If affirmative action by Congress to revise the existing law is to be obtained at the present session, the need is obvious for presenting the matter to Congress and the country without further delay.

"Specifically, we urge elimination of the provision that precludes any contract for the sale of coal for longer than 30 days ahead. This restriction stands as a barrier to stabilized operations at the mines.

"We urge elimination of the 1c. tonnage tax, which constitutes an extra three or four million dollar annual tax levy upon our industry both onerous and unjustified.

Want Code Plan Scrapped

"We believe that the present code plan which the acts sets up and which has entailed an incredible volume of red tape and expensive and cumbersome administrative machinery and contains price provisions which have proven so impracticable, ought to be eliminated and in its stead that the voluntary sales agency provision of the law should be so amplified as will permit wide and effective utilization of sales agencies under appropriate federal supervision calculated to afford ample protection against monopolistic practices and to safeguard the mine owners, the mine workers and the consumers."

The committee comprises the following operators:

John A. Howe, vice-president, Truax-Traer Coal Co. (chairman); E. M. Douthat, Sinclair Coal Co.; Hubert Howard, president, Binkley Mining Co.; Frank Davis, president, St. Louis & O'Fallon Coal Co.; R. H. Sherwood, president, Central Indiana Coal Co.; David Ingle, president, Ingle Coal Co.; Alva Bradley, president, United States Coal Co.; Joseph Cunningham, president, Crummies Creek Coal Co.; Calvin Holmes, president, Holmes-Darst Coal Co.; F. A. Huber, assistant to the president, Ford Collieries Co.; William H. Cooke, Walter Bledsoe & Co.; J. T. M. Stoneroad, president, Carnegie Coal Corporation; J. D. A. Morrow, president, Pittsburgh Coal Co.; A. G. Schiedenhelm, president, Pittsburgh & Erie Coal Co.; Ralph E. Jamison, Jamison Coal & Coke

Coming Meetings

- Canadian Institute of Mining and Metallurgy: annual meeting, March 13-15, Chateau Frontenac, Montreal, Que., Canada.
- Lehigh Valley Coal Association: annual meeting, March 23, Bethlehem, Pa.
- Midwest Power Conference: annual meeting, April 5-7, Palmer House, Chicago.
- American Mining Congress: sixteenth annual coal-mining convention and exposition, April 24-28, Music Hall, Cincinnati, Ohio.
- Second Annual Anthracite Conference: April 28 and 29, Lehigh University, Bethlehem, Pa.
- American Coal Distributors' Association: annual meeting, May 25-27, French Lick Springs, Ind.
- Mine Inspectors' Institute of America: thirtieth annual convention, June 5-7, William Penn Hotel, Pittsburgh, Pa.
- Illinois Mining Institute: 21st annual boat trip and summer meeting, June 9-11, aboard Str. "Golden Eagle," leaving St. Louis June 9 and returning June 11.

Co.; F. G. West, Butler Consolidated Coal Co.; James Walter Carter, president, Carter Coal Co.; F. A. Armstrong, Mather Collieries Co.; James D. Francis, president, Island Creek Coal Co.; C. A. Gabell, president, Carbon Fuel Co.; J. P. Williams, Jr., president, Koppers Coal Co.; O. L. Alexander, president, Pocahontas Fuel Co.; J. Noble Snider, vice-president, Consolidation Coal Co.; R. L. Ireland, Jr., president, Hanna Coal Co.; George H. Love, president, Union Collieries Co.; Whitney Warner, president, North American Coal Corporation; Charles C. Dickinson, president, Dickinson Fuel Co.; Brent Hart, president, Hart Coal Co.; C. F. Richardson, president, West Kentucky Coal Co.; J. G. Bradley, president, Elk River Coal & Lumber Co.; Ralph Knode, president, Westmoreland Coal Co.; Charles B. Baton, vice-president, Baton Coal Co.; Charles N. Templeton, general manager, Linton-Summit Coal Co.; D. H. Morton, president, Winifrede Collieries, Inc.; Samuel Pursglove, president, Pursglove Coal Mining Co.

Within eight days, 35 more operators had joined the clamor for revision.

Percy Tetlow, chairman of the Commission, accused the operators of "bushwhacking," asserting that they might much better be spending their time cooperating and helping the Commission to establish prices. With the concurrence of the other members of the Commission, Commissioner C. E. Smith also issued a reply to criticism of the coal act by J. D. A. Morrow, made in an address on Jan 21 at Birmingham, Ala.

Blames General Conditions

The present demoralization of coal prices, said Mr. Smith, cannot be generally attributed to the act. The drop in production last year, he added, was associated with the sharp recession of general business as well as with the abnormally warm weather.

Mr. Morrow's declaration that the Commission has gotten exactly nowhere to date, continued Commissioner Smith, "is a slightly inaccurate statement, to put it mildly. Since prices were revoked last February the Commission has been laying the foundation for the establishment of prices which will be in conformity with the standards set forth in the act. This has necessitated the holding of extensive hearings in Washington as well as in the field. On the basis of the evidence adduced at the hearings, the Commission has at this time issued voluminous findings and has modified, for coordination purposes only, the prices and regulations proposed by all but one board.

"Under Commission orders, all district boards, with the exception of those for Districts Nos. 9 to 12 inclusive, are now coordinating prices and rules and regulations. The Far Western district boards have practically completed this work, the Eastern boards are coordinating the prices and regulations approved by the Commission for their code members, and the Midwestern boards will begin their coordination duties in the immediate future. At the present time there is no indication that this part of the price-establishing procedure will not be completed without delay.

"Immediately thereafter a full and complete hearing will be held upon the coordinated prices and rules and regulations. I cannot agree that at such a hearing 'any and every interested party must have all the time he requires to submit evidence with respect to his objections or claims, whether he be a producer or consumer of coal.' The Commission, as an administrative body, has undoubted authority to place reasonable limits upon the time allotted persons who desire to appear and be heard at such hearing. In so doing the Commission will meet the requirements of due process."

Commissioner Smith said the Commission welcomed the establishment and functioning of sales agencies and has cooperated unreservedly with the industry in the erection of such organizations. However, he said he was firmly convinced that the operation of such agencies alone, without the existence of a floor level of prices, will not result in stabilizing marketing conditions.

Constitutionality of the coal act was sustained in a unanimous decision by a special three-judge Federal Court on Feb. 16. Written by Justice Miller of the U. S. Court of Appeals for the district of Columbia, the opinion denied an injunction sought by the city of Atlanta, Ga., which sought to restrain the Commission from promulgating minimum prices on the ground that the act was unconstitutional.

Granting the government's motion to dismiss the litigation, Justice Miller's ruling held that: "Conditions in the marketing of coal have long been more or less chaotic, with the result that the flow of commerce in coal has been seriously burdened and impaired. It was to eradicate this evil, and to prevent its recurrence, that the Congress acted to protect interstate commerce.

"Neither does the act in its price-fixing provisions make excessive delegation of legislative power. Finally, we hold that the act constitutes no infringement of the sovereign powers of the city of Atlanta and no usurpation of powers reserved to the States by the Tenth Amendment.

"As the fixing of coal prices, as provided by the act, comes properly within the scope of the commerce clause, conflicting powers of the States must give way so far as may be necessary."

The legal battle over revelation of cost data was concluded on Jan. 30, when the Supreme Court upheld the Commission's right to disclose such information. In a decision delivered by Justice McReynolds, the court affirmed a ruling by the Federal Court of Appeals for the District of Columbia denying an injunction against the Commission sought by the Utah Fuel Co. and eighteen other companies. Justice McReynolds' ruling concluded: "Obviously, publication may be harmful to petitioners, but, as Congress had adequate power to authorize it and has used language adequate thereto, we can find here no sufficient basis for an injunction."

The next day the Commission took action to complete its hearing and record for the determination of weighted average costs upon which to base minimum prices. It ordered the basic cost reports to be made available to interested parties for inspection here and at Denver, Colo., beginning Feb. 6. Cost records for Minimum Price Areas 1, 2, 3 and 5 were to be opened here, and those for areas 4, 6, 7, 9 and 10 were to be available in Denver.

Consumers' Counsel John Carson has announced that he contemplates holding conferences preceding the public hearings on prices to be held here, in Denver and perhaps Chicago. He invites consumers of every class, kind and character to participate in order that the Commission may receive the full benefit of their advice and counsel concerning coal prices.

The distributors' hearing closed on Feb. 9. A large portion of the sessions was taken up with discussion of definitions in connection with who should be entitled to registration as "distributors" and therefore entitled to discounts. Cooperative organizations took a prominent part in the proceedings.

The Smokeless Coal Corporation has petitioned the Commission for approval of changes in forms of contracts between the corporation and low-volatile producers and subagents. The Commission has granted captive exemption to one Pennsylvania and two Ohio companies on coal produced by them and consumed in their manufacturing plants. Withdrawal of exemption applications has been permitted to two producers in Iowa, one in Illinois, one in Kentucky, and one in Alabama. Applications for exemption by sixteen Tennessee companies alleging that their transactions are in intrastate commerce have been dismissed, the Commission's order stating that the applications are premature, as no order subjecting transactions in coal in intrastate commerce to the provisions of the act has as yet been issued.

Sales of Mechanical Stokers Show Seasonal Decline

Sales of mechanical stokers in the United States during December last totaled 4,971, according to statistics furnished the U. S. Bureau of the Census by 112 manufacturers (Class 1, 64; Class 2, 40; Class 3, 47; Class 4, 34; Class 5, 11). This compares with sales of 7,917 units in the preceding month and 4,609 in December, 1937. Sales by classes in December last were: residential (under 61 lb. of coal per hour), 3,947 (bituminous, 3,376; anthracite, 571); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 407; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 398; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 164; high-pressure industrial steam plants (more than 1,200 lb. per hour), 55.

Anthracite Convention Set

Preparations for negotiation of a new wage agreement in the anthracite region of Pennsylvania to supersede the present contract, which expires on April 30, began on Feb. 3 with a meeting of United Mine Workers officials at Washington, D. C., when it was decided to hold the tri-district convention at the Hotel Commodore, New York City, beginning March 31. At that time the union demands will be formulated. Whether they will

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include a 30-hour work week instead of the present one of 35 hours, as has been reported, remains to be seen.

When the demands have been devised, the U.M.W. scale committee of six will meet with a similar group of operators to negotiate the agreement. The union group consists of John L. Lewis, international president; Philip J. Murray, vice-president; Thomas Kennedy, secretary-treasurer; M. J. Kosik, president of District 1; Hugh Brown, president, District 7; and Martin Brennan, president, District 9.

Utility to Market Stokers As Electric Appliances

In cooperation with coal producers comprising the Bituminous Coal Utilization Committee for Kansas, Missouri and Oklahoma, which was organized on Feb. 1, as well as several large stoker manufacturers, the Kansas City Power & Light Co., Kansas City, Mo., is launching a program of selling stokers and automatic heat, beginning on Feb. 26. This utility is the first to indorse and promote automatic coal stoker heat as an electrical appliance, in the same category with electric ranges, refrigerators, washing machines, radios, etc.

The campaign is being started with a full-page newspaper "ad" timed to run as the Better Homes Show starts, with ads of similar size to run once a week for 52 weeks. Prominent space also has been taken at the show, where twelve different makes of stokers will be exhibited, as well as various types of stoker coals. The principal cost of the exhibition space will be defrayed by the Coal Utilization Committee, and each stoker manufacturer exhibiting will contribute a share in making up the balance. The manufacturers whose products have been selected thus far include Link-Belt, Combustioneer, Stokol, Delco, Butler and Winkler, and several others are under consideration.

An advertising fund of $15,000 has been contributed by the operators to be used not only to promote the use of stokers but to educate home owners to the comfort, convenience, safety and economy of automatic heat with their use. The economy feature is emphasized with the slogan, "Only 15c. per day over the heating season." All stokers sold in the utility's territory may be financed with power bills on small monthly payments. The operators' committee includes: A. R. Stock, sales manager, Sinclair Coal Co.; George F. Klein, consulting engineer, Mackie-Clemens Fuel Co.; A. F. McElhenie, vice-president, Pittsburg & Midway Coal Mining Co.; F. R. Hayde, district manager, Binkley Mining Co., and W. E. Blucher, secretary, Kansas City Coal Service Institute.

Buys Lillybrook Interest

J. A. Hunt's interest in the Lillybrook Coal Co., Beckley, W. Va., has been acquired by Dr. J. H. McCulloch, according to an announcement by the latter. Dr. McCulloch also will succeed Mr. Hunt as president and general manager. The company has two mines in Raleigh County.

Personal Notes

A. LEE BARRETT, formerly electrical engineer for the Pittsburgh Coal Co., has been named maintenance engineer.

JAMES BELCHER has been promoted from assistant safety director to general mine foreman by the Mallory Coal Co., Mallory, W. Va.

JAMES BENSON has been appointed safety director by the Raleigh-Wyoming Mining Co., Beckley, W. Va.

W. A. BREWERTON has resigned from the presidency of the Brewerton Co., which operates the Jefferson mine, Springfield, Ill.

J. F. BUCHANAN has been made mine foreman at Milburn Nos. 1 and 2 mines of the Milburn By-Products Coal Co., Milburn, W. Va.

EDWARD L. CARR, assistant to the president, Bell & Zoller Coal & Mining Co., who succeeded George W. Reed as a member of District 10 Bituminous Coal Producers' Board under the Guffey-Vinson act, has been unanimously elected chairman of the Illinois group.

AUBREY CHANEY has been promoted from assistant foreman to general mine foreman at the Micco mine of the West Virginia Coal & Coke Corporation, Micco, W. Va.

TOM K. CHRISTIAN has been advanced from assistant night foreman to assistant safety director of the Mallory Coal Co., Mallory, W. Va.

ROBERT COOPER has been named assistant superintendent at Nos. 4 and 5 mines of the United States Coal & Coke Co., Thorpe, W. Va.

DAVID CUNNINGHAM, hitherto assistant superintendent at Montour No. 10 mine of the Pittsburgh Coal Co., Library, Pa., has been made superintendent at the company's Lindley mine, Houston, Pa.

J. O. DAVIS has been appointed division superintendent at the Keystone, Carswell and Maitland mines of the Koppers Coal Co., McDowell County, West Virginia.

THOMAS DOUGHTY has been made superintendent of construction by the Glen Alden Coal Co., Scranton, Pa.

H. E. EWING, for the last three years superintendent at the mines of the Jewell Ridge Coal Corporation, Jewell Ridge, Va., has resigned.

T. G. FERGUSON, formerly assistant superintendent at Banning No. 2 mine of the Pittsburgh Coal Co., Whitsett, Pa., has been named superintendent at the company's Westland mine, Westland, Pa.

L. E. FERRELL has been made mine foreman at the Star Slope mine of the Dixport Coal Co., Cinco, W. Va.

MILTON H. FIES, vice-president in charge of operations, DeBardeleben Coal Corporation, Birmingham, Ala., has been appointed by Secretary of the Interior Ickes as a consulting engineer with the U. S. Bureau of Mines in the Southern area.

GEORGE P. FITZ, general manager, Ajax Coal Co., Hazard, Ky., has been reelected president of the Hazard Coal Operators' Association. Other officers renamed are: vice-president, D. T. PRITCHARD, general superintendent, Algoma Block Coal Co.; secretary-treasurer, A. E. SILCOTT.

O. D. FLATT has been named superintendent at Nos. 1, 3, 4 and 5 mines of the Raleigh-Wyoming Mining Co., in Raleigh and Wyoming counties, West Virginia.

EDWARD G. FOX has been appointed general manager in charge of operations by the Colonial Colliery Co., Frackville, Pa.

DAVID F. FULE has been made safety director by the Green Valley and Getty coal companies, Rosemont and Hepzibah, W. Va. Both companies are controlled by the Reppert Coal Co.

MICHAEL GALLAGHER has been appointed assistant to the vice-president of the Western Pocahontas Corporation, with headquarters in Cleveland, Ohio. The corporation is a subsidiary of the Chesapeake & Ohio Ry., with extensive coal-land holdings on that road. Formerly president of the Northwestern Mining & Exchange Co. and the Pittston Co., Mr. Gallagher also has been three times vice-president of the National Coal Association and has been a director practically since its inception.

WILLIAM HANDS has been named mine foreman at No. 5 mine of the Pursglove Gas Coal Corporation, Pursglove, W. Va.

C. H. HART, formerly bearing the title of standards supervisor with the Pittsburgh Coal Co., Pittsburgh, Pa., has been given the new title of industrial engineer.

OTTO HERRES, formerly vice-president in charge of operations and general manager of the United States Fuel Co., Salt Lake City, Utah, and lately practicing as a consulting engineer, has become assistant to the general manager of Snyder Mines, Inc., and the Combined Metals Reduction Co.

JOHN A. IVIE has been appointed by Governor Dixon of Alabama as an associate mine inspector, effective Feb. 1.

J. K. JOHNSTONE, an associate State mine inspector in Alabama for several years, resigned on Jan. 31 to accept a position in the mining department of the Tennessee Coal, Iron & Railroad Co.

WILLIAM R. FITZPATRICK has been made vice-president in charge of sales by the Colonial Colliery Co., with headquarters at Philadelphia, Pa. He succeeds G. H. SHRYOCK, who resigned as of Feb. 15.

L. M. LINEHERRY has been appointed superintendent of Nos. 2, 4 and 5 mines of the United States Coal & Coke Co., McDowell County, West Virginia.

LANE LOVETT, heretofore inspection engineer for the Pittsburgh Coal Co., Pittsburgh, Pa., has been made shop superintendent.

ROBERT F. MCCAMMON has been named vice-president in charge of sales promotion by the Colonial Colliery Co., with headquarters in Philadelphia, Pa. The company's operating office is at Frackville, Pa.

W. S. MCCONNELL has been appointed mine foreman at the Maitland mine of the Koppers Coal Co., Maitland, W. Va.

E. J. MCCROSSIN, JR., has been named by Governor Dixon as chief mine inspec-

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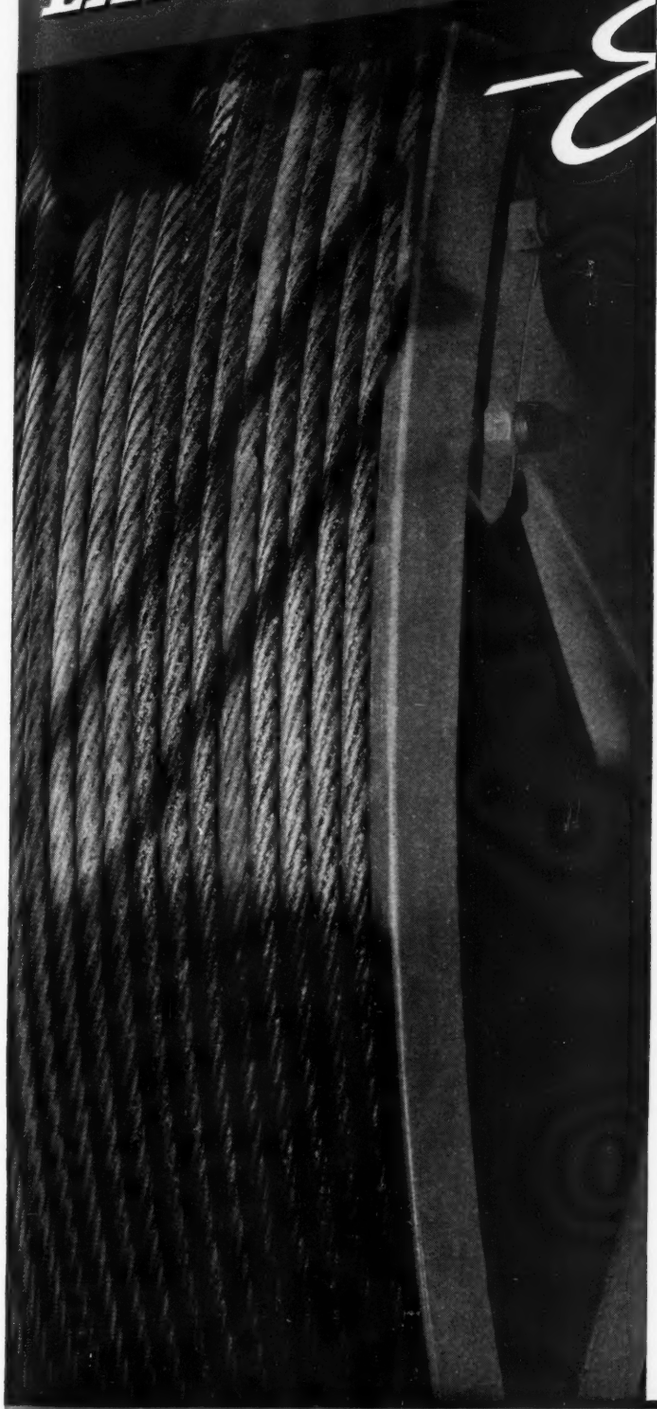

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tor of the Alabama State Mining Department, succeeding W. B. HILLHOUSE. The new appointee has been associated with coal mining operations in the district for a number of years, his most recent connection being chief mining engineer for the DeBardeleben Coal Corporation. The mine inspection department is to be included in a new bureau to be established, known as the Department of Industrial Relations.

P. J. MCPARLAND has been appointed general superintendent of the West Virginia division of the United States Coal & Coke Co., vice William C. Hood. His headquarters will be at Gary, W. Va. He was formerly stationed at the company's Lynch (Ky.) operations.

E. J. MILLER has been named mine foreman at the Morrison mine of the Morrison Coal Co., Glen Morrison, W. Va.

FRANK MILLER, safety director at Wharton mine of the Koppers Coal Co., Wharton, W. Va., has been promoted to district inspector for the company and will be stationed at Madison.

ROBERT MONTGOMERY has been made chief mining engineer for the DeBardeleben Coal Corporation, Birmingham, Ala., vice E. J. McCrossin, Jr., resigned. Mr. Montgomery has been connected in an engineering capacity at various times with the Woodward Iron Co., Corona Coal & Iron Co. and Gulf States Steel Co.

GEORGE H. MORSE, vice-president in charge of operations of the Union Collieries Co., has been reelected president of the Coal Operators' Association of the Thick Vein Freeport Seam. Other officers renamed are: vice-president, W. P. VANCE, general superintendent, Butler Consolidated Coal Co.; secretary, C. W. GIBBS; treasurer, GEORGE C. TREVORROW; chairman, scale committee, W. L. AFFELDER, vice-president in charge of operations, Hillman Coal & Coke Co.

WILLIAM L. NEILL has been appointed an associate State mine inspector in Alabama, assuming his duties on Feb. 6.

JAMES NICOL, who resigned as an associate State mine inspector in Alabama on Jan. 31, has accepted a position in the mining department of the Republic Steel Corporation.

RICHARD H. NISBET has been appointed superintendent at the Hugheston mine of Kanawha Coals, Inc., Hugheston, W. Va.

J. E. NORTON, hitherto chief clerk, preparation department, for the Pittsburgh Coal Co., Pittsburgh, Pa., has been designated as production scheduler.

FRANK ORECCHIO, Florence (Colo.) coal operator, has been named to membership on District 17 Bituminous Coal Producers' Board, to fill the unexpired term of David L. Hansen, deceased.

H. G. OWENBY has been named mine foreman at Mason No. 1 mine of the Mason Coal Co., Norvell, W. Va.

DAVID PURSGLOVE has been made superintendent at No. 2 mine of the Pursglove Coal Mining Co. and at No. 5 mine of the Pursglove Gas Coal Co., Pursglove, W. Va.

WILLIAM REPPERT has been appointed superintendent at the Eagle mine of the Getty Coal Co., Hepzibah, W. Va.

W. M. RICHARDSON has been named mine foreman at No. 21 mine of the Industrial Collieries Corporation, Dellslow, W. Va.

E. E. RITTER has been elected president and general manager of the Red Jacket Coal Corporation, operating in Mingo and Wyoming counties, West Virginia. In returning to his old post, Mr. Ritter succeeds L. E. Woods, who resigned after several months' tenure.

JOHN ROBLEE, formerly assistant electrical engineer for the Pittsburgh Coal Co., Pittsburgh, Pa., has been appointed electrical engineer.

H. C. ROSE, heretofore mine superintendent at the Westland mine of the Pittsburgh Coal Co., Westland, Pa., has been made assistant production manager.

ERNEST F. RUMPF has been elected a vice-president of the Pittsburgh Coal Co., Pittsburgh, Pa. He will be responsible for the organization of budgetary control in the company administration. He was formerly secretary and controller of the Kenwood Mills, Albany, N. Y.

JACK SCHREIBER, formerly assistant to the coordinator of the Retail Solid Fuel Industry in New York City, has been named as coordinator. He succeeds Oscar F. Ostby, who served for a short time as acting coordinator following the resignation of Roderick Stephens.

JOHN B. SCOTT, formerly a representative of the Anthracite Institute, has become associated with Pierce Management, engineering consultants and mine managers, Scranton, Pa., as manager of sales.

ROSS C. SMITH, Birmingham, Ala., has been named as manager of the District 13 Statistical division under the Bituminous Coal Act. He succeeds JOHN D. PETREE, who has been appointed head of the Unemployment Compensation Commission of Alabama.

J. J. SNURE has been appointed superintendent at Milburn Nos. 1 and 2 mines of the Milburn By-Products Coal Co., Milburn, W. Va.

DOMINICK SORRENT has been made assistant superintendent at No. 22 mine of the Island Creek Coal Co., Holden, W. Va.

W. R. STEDMAN has been named assistant general superintendent by the United States Coal & Coke Co., Gary, W. Va.

J. L. SULLIVAN has been made general superintendent of the Kentucky division of the United States Coal & Coke Co., with headquarters at Lynch, Ky. He is a lifelong employee of the company.

Permissible Plates Issued

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Jeffrey Manufacturing Co.: Type 35-20S shortwall mining machine; either 20- or 35-hp. motor, 250 and 500 volts, d.c.; Approvals 363 and 363A; Jan. 9.

Goodman Manufacturing Co.: Type G-12½ shaker conveyor; 10-hp. motor, 250 volts, d.c.; Approval 308; Jan. 27.

EVAN THOMAS has resigned as superintendent for the Sycamore Coal Co., Cinderella, W. Va., after 28 years' service in that position. A watch was presented to him as a token of esteem by men who had worked under him for 26 years.

H. R. WHEELER, formerly assistant to the president, Pittsburgh Coal Co., Pittsburgh, Pa., has been appointed planning manager.

DAVID WILLIAMSON, formerly receiver for the Maryland Coal Co. of West Virginia, Wendel, W. Va., has been made general manager for the company. He has been with the organization for 25 years.

LACO WILMOTH has been named mine foreman at the Eagle mine of the Getty Coal Co., Hepzibah, W. Va.

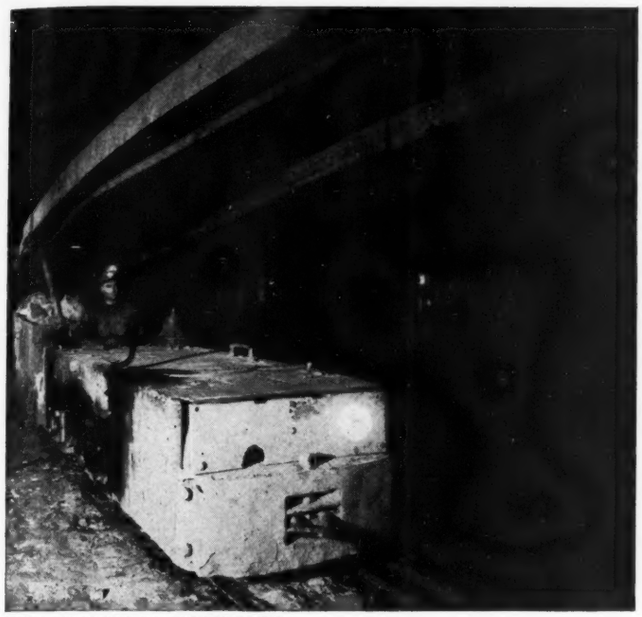
Technology and Uses Keynote Hard-Coal Conference

Discussion at the second annual Anthracite Conference, to be held April 28 and 29 at Lehigh University, Bethlehem, Pa., will center about technology and utilization, designed to collate the results of researches in the combustion and economy of hard coal, together with experience in production, preparation and utilization. According to Prof. Howard Eckfeldt, head of the mining engineering department at Lehigh and chairman of the conference committee, the general topics to be considered include merchandising methods, anthracite in the home and in industry, combustion characteristics, uses, mining and preparation, and the economics of anthracite.

In addition to morning and afternoon sessions on the first day and a morning session on the second day there will be a dinner meeting on April 29, with Frank W. Earnest, Jr., president of Anthracite Industries, Inc., as toastmaster. Honorary chairmen of the conference are Dr. C. C. Williams, president of Lehigh; A. C. Dodson, president, Weston Dodson & Co., Inc.; S. D. Warriner, chairman of the board, Lehigh Navigation Coal Co., and Mr. Earnest.

Papers will be presented by nineteen authorities, as follows: "Design of Retail Coal Yards," E. E. Finn, Anthracite Industries Laboratory; "Modern Merchandising of "Anthracite," R. W. Disque, executive secretary, Syracuse (N. Y.) Coal Exchange; "Planning the Modern Anthracite Home," T. I. Coe, American Institute of Architects; "Anthracite for Warm-Air Heating," Prof. A. P. Kratz, University of Illinois; "The Expanding Domestic Anthracite Market," A. J. Johnson, director, Anthracite Industries Laboratory; "The Use of Anthracite in Gas Producers," Prof. Eric Sinkinson, Lehigh University; "Commercial Cooking With Anthracite," C. A. Connell, Lehigh Navigation Coal Co.; "The Design of Semi-Industrial Stokers for Anthracite," R. A. Krauss, Anthracite Industries Laboratory; "Anthracite as a Metallurgical Fuel," R. H. Sweetser; "Building Materials From Anthracite Ash," R. C. Johnson; "Agricultural Uses of Anthracite Ash," Dr. H. J. Rose, Mellon Institute; "Correlation of Coal Sizes to Mechanical Equipment," P. A. Mulcey, assistant director, Anthracite Industries Laboratory; "Burning Characteristics of Anthracite," P.

IN THE MINING INDUSTRY
INVARIABLY YOU'LL FIND



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Nicholls, supervising fuel engineer, U. S. Bureau of Mines, Pittsburgh, Pa., and B. A. Landry; "Midwest Markets for Anthracite," K. C. Richmond, editor of *Coal Heat;* "Some Economic Aspects of Anthracite," Neil Carothers, dean of College of Business Administration, Lehigh University; "Mechanization in Modern Anthracite Mining," E. C. Weichel, Hudson Coal Co.; "Sink and Float Processes for the Beneficiation of Anthracite," W. B. Foulke, E. I. duPont de Nemours & Co., Inc.

Bill in Iowa Legislature To Tax Strip Mining

A "conservation" measure designed to eliminate the so-called evils of strip mining was presented in the Iowa Legislature for consideration late in January. The bill provides for a tax of 25c. a ton on all coal produced by open-cut or strip mining, the money to be used to replace soil disturbed by stripping operations, unless the operator himself has it replaced.

State Representative Hoegh, author of the proposed legislation, says the State's farm lands face certain ruin unless strip mining is placed under some form of regulation. It is not fair to the future, it is asserted, to have acres of landscape marred by such operations; and the land is removed from productivity, also from value as taxable property.

The bill was approved Feb. 18 by the House Ways and Means Committee, with the recommendation that it be enacted.

To Conduct Chimney Tests

A series of tests on several experimental chimneys of proper size and construction for domestic boilers to determine some basic facts about chimneys and draft as related to domestic boilers under 1,000 sq.ft. of steam-radiation capacity is to be conducted by Anthracite Industries, Inc., at its laboratory at Primos, Pa. In announcing the study, following a meeting of the subcommittee on chimneys of the American Society of Heating and Ventilating Engineers, Allen J. Johnson, director of the laboratory, who presided at the meeting, stressed the importance of the investigation to the anthracite industry and added that arrangements might be made to include other fuels.

As the importance of the work becomes apparent, said Mr. Johnson, other fuel organizations no doubt will carry on investigations of their own to check the work of the committee and obtain data peculiar to their own fields. R. M. Dill, of the U. S. Bureau of Standards, outlined the work being done by the Bureau, pointing out that it is tied in with boiler ratings. The Institute of Boiler and Radiator Manufacturers, he said, is working on a parallel problem.

Hudson Coal Moves Office

The Hudson Coal Co. moved into new offices in the Grand Central Building, 230 Park Ave., New York City, on Feb. 20. Its headquarters had been at 32 Nassau St. for a number of years.

Industry's Forward Steps During 1938 Outlined at A.I.M.E. Meeting

A CLEARER understanding of the solutions of the technical problems which hamper the progress of the coal industry was evident at the 150th meeting of the American Institute of Mining and Metallurgical Engineers, which assembled in New York, Feb. 12-16 and discussed a wide range of subjects—preparation, posting, timber preservation, accidents, coal origin, carbonization, bootlegging, domestic stokers, cutter bits, mine tractors, loading, roof control and education.

Because of the immense pressures at the face, experiments with longwall faces, 300 to 400 ft. long, in the Northern Anthracite Field proved impractical until three-piece steel props were substituted for wood props. In mining a block of coal, 300x 1,200 ft., in which two chambers were widened to give the required 300-ft. width, hand-loaded shaker conveyors replaced the original scraper loader and Langham collapsible steel props were installed in tandem lines to support the roof.

Anthracite Longwall Workings

In practice, 200 ft. of the 300-ft. face was loaded out per day, an average production of 115 net tons, or about 9.6 tons per man. Experience gained from the original experiment was then transposed into operating practice in a 165-acre tract containing the Dunmore No. 3 bed, averaging at this point 6 ft. in thickness, and the Dunmore No. 4 bed, which was 4 ft. thick with a 40-ft. interval between the two seams.

A retreating longwall was blocked out by a series of double gangways, located 235 to 400 ft. apart, which were driven to the property line, and work was commenced in the upper seam to extract the coal and cave a sufficient area before work of similar character was undertaken in the lower bed. Five-foot Langham collapsible steel props with wood cap pieces were first set on 4-ft. centers, which were then reduced to 3-ft. and finally to 30-in. centers, because of extreme weight of overburden. Between the first and second row of props a shaking conveyor was placed, into which coal was loaded by hand. To control the roof, from four to five rows of props were set.

Production from these faces averaged 12.5 tons per man, as compared with 9.6 tons per man in the original experiment, and the comparative safety of this method was shown by the award of six safety performance banners to the foremen in charge of this work, as compared with a total of 32 banners awarded to foremen in charge of all other methods of mining.

Costs for the steel jacks on three faces totaled $0.133 per ton, whereas the cost of wood props would have been $0.40 to $0.60 per ton, with all items included except purchase price. The company has now mined two and one-half million tons by the steel-prop method and has seven such faces in operation.

One company treated 223,258 hardwood main-haulage ties with zinc chloride, impregnating them by the pressure process with a net retention of ½ lb. of zinc chloride per cubic foot. These they installed in a group of bituminous mines during the years 1928, 1929 and 1930 at a cost of $0.7133 per tie delivered to the mines, as against cost of untreated ties at $0.4017 each, said Reamy Joyce, district sales manager, Wood Preserving Corporation. Treated ties therefore cost 77 per cent more than untreated ties, but the actual cost of treated ties after they were installed in the track was only about 34 per cent more than for untreated ties and totaled $69,602.53. These treated ties have now been in place 8.78 years.

Allowing two renewals of this number of untreated ties in the approximate nine years recorded, the cost in track of an untreated tie, plus labor for renewal, etc., should be $0.82155. Two renewals of 223,258 ties at this figure would give a saving based on a twelve-year average life of $366,835.22, representing a profit to date on the added cost of the treated mine ties of 527 per cent. Mr. Joyce pointed out that the added cost of the treated tie was more than offset by the saving of the cost of the first renewal of an untreated one.

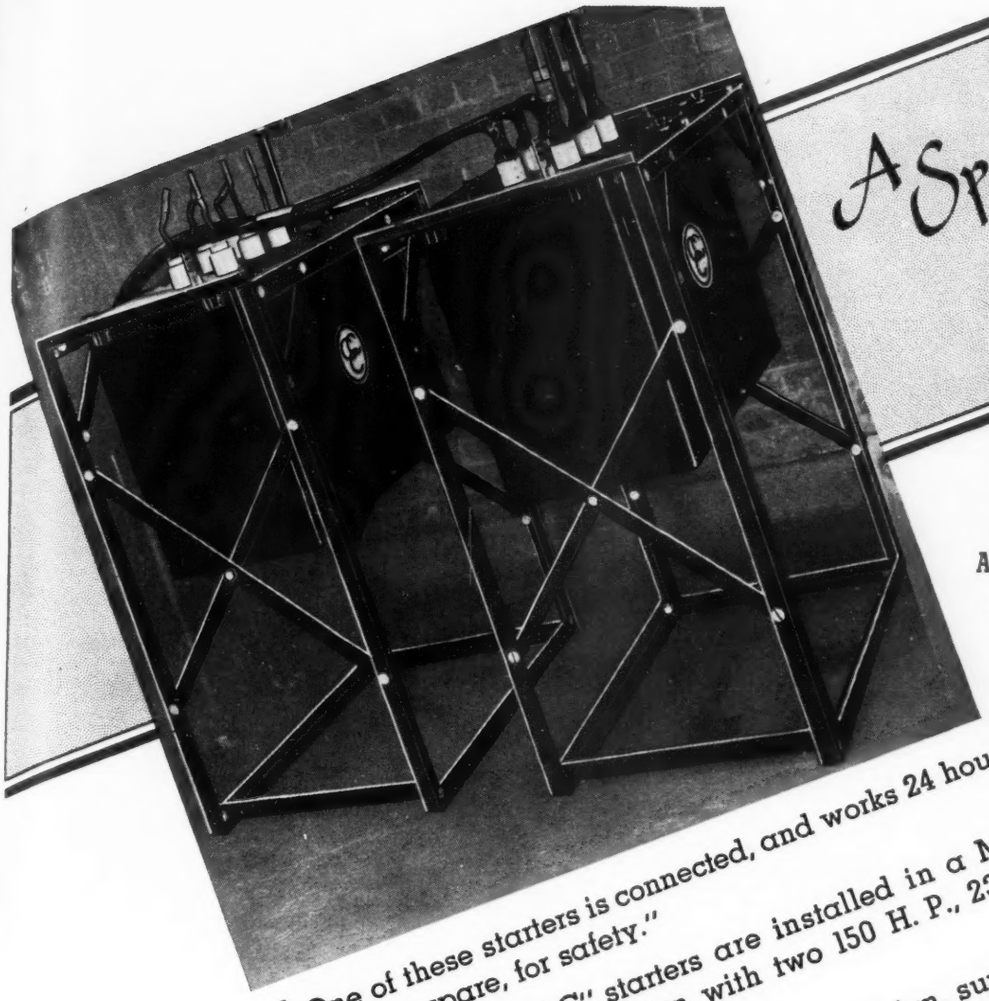
Another case history was cited where 3,809 creosoted 5x7-in.x6-ft. sawed southern pine ties were impregnated with 8 lb. of creosote per cubic foot of timber by the Rueping process and installed on the mine bottom in a new bituminous operation. Cost of these ties was $1.13 each delivered to the mine, as against the cost of untreated mixed hardwood ties at $0.28 each. The creosoted ties and their protective tie plates cost 5.08 times as much as the untreated ties. The cost of these creosoted ties tie-plated and installed, was 1.78 times as much as that of the untreated ties but their estimated mine life was twenty years. Labor cost of installation was figured at 50¢ per tie and labor cost of renewing at 80¢ per tie. With an expected life of untreated hardwood ties of not more than four years and creosoted pine of not less than twenty years, the following calculation was given.

	Each
Untreated hardwood, cost in track...	$0.78
Four renewals at $1.08.....	4.32
Total 20-year cost of untreated ties..	$5.10

Creosoted Southern pine ties at $1.13, plus two tie plates at $0.294 and installation labor at $0.50, makes a total cost of $1.924. This is a saving of $3.176 per tie over the 20-year period, but in this calculation no consideration is given to interest charges.

Many Ties Will Last 33 Years

During the 21 years which have elapsed since these 3,809 ties were installed, 100 were replaced after eighteen years' service, and last year ten additional ties were replaced. In 1938, additional coal lands were secured which will extend the life of this mine another fifteen years and, from recent inspection, it is believed that most of these creosoted ties will give many more years of service. Mr. Joyce pointed out the advantages of treating the wood bottoms of composite mine cars and cited savings made from the use of



A Spare for Safety

"3C" SPECIAL
BULLETIN 6070
HIGH VOLTAGE
ACROSS-THE-LINE
A.C. AUTOMATIC
STARTERS

One of these starters is connected, and works 24 hours a day; the other is "a spare, for safety."

Both of these "3C" starters are installed in a Mid-West Coal Mine, for use in connection with two 150 H. P., 2300 V., 3 phase, 60 cycle squirrel cage motors.

One motor and "3C" Starter operate a 111" mine fan, supplying ventilation for the entire mine. This fan, at 640 R. P. M. has a capacity of 190,000 cu. ft. per minute, at about 3.8" water gauge.

Both motors are mounted so that either can quickly be connected to the fan. Both starters are arranged so that either starter can quickly be connected to either motor. This arrangement insures ventilation at all times, and in any emergency.

These "3C" High Voltage, Oil Immersed Starters have contactors particularly designed for use under oil, using larger Contact Tips, wider opening, and a different amount of wiping action in closing.

Your electrical control problems will receive prompt response from our nearest office.

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timber treated both with creosote and salts.

Creosoted timbers, declared D. Harrington, U. S. Bureau of Mines, introduce a fire hazard and may subject those handling them to a specific skin disease. Though these timbers, said Mr. Joyce, for the first six months undoubtedly are more flammable than untreated materials, after that time the surface volatilization of the creosote eliminates this hazard. A skin disease, he added, sometimes develops when men lack experience in handling the timber, but when it has been stacked after treatment, such possibilities are remote.

Organized efforts of the Philadelphia & Reading Coal & Iron Co. in accident prevention were detailed by H. A. Leidlich. Its safety work begins with a careful selection of men for employment and is followed by specific instruction in safe methods, with a stressing of the fact that new men need training. Departmental committees meet monthly, and sectional committees hold meetings once a week, so that every employee in the organization is personally impressed with the importance of safe conduct.

With a series of stereopticon slides showing detailed formulas and photographs of synthetic coals to exhibit their chemical and physical characteristics, E. Berl, Carnegie Institute of Technology, discussed the origin of coal. G. H. Ashley, Pennsylvania State geologist, referred to the so-called accepted theory of coal formation and cited structural similarities in lignites and bituminous coal from various districts in support of it.

Carbonization Plant Building

Pointing to the rapidly increasing consumer demand for automatic stoker fuel and the possibilities of new outlets for coal as raw material in a new chemical industry producing tar-base plastics and synthetic resins, M. D. Curran described the plant of the Radiant Fuel Corporation, which turns Illinois screenings into domestic coke (*Coal Age*, November, 1934, p. 421), and to another similar plant now under construction, for the Midwest Smokeless Coal Corporation, near Belleville, Ill.

Experiments in the development of a fuel-gas producer using electrical energy as a source of heat were described by W. J. Darby, co-author of the paper with H. A. Curtis and Ralph Stitzer. The initial laboratory test started in Knoxville, Tenn., in 1934, and was transfered in 1935 and 1936 to the Tennessee Valley Authority's dam, where a final continuous-type retort was devised, using 175- to 200-volt current, and envisioning the use of off-peak current. Discussion brought out the fact that the experiments were only of academic interest at the present time, due to the high cost of electric power.

Unfortunately, washability curves have been plotted hitherto in a way that makes their interpretation difficult. A rational method of constructing such curves, declared H. J. Rose, senior industrial fellow, Mellon Institute, is to plot the specific gravities along the horizontal axis and the percentage data as to yield, highest-ash piece floated (elementary ash) and cumulative ash along the vertical axis from zero upward. With this arrangement, the values increase in the direction one would normally expect such increases to occur. Thereby, all curves are rendered more simple, especially that of the highest-ash piece floated, which at the higher specific gravities droops a little because of the presence of pyrite, but in other ranges is so straight as to aid in intrapolation or in the checking of other curves.

Zinc chloride displaces moisture; hence a true specific-gravity test is not obtained with it. The specific gravity of the zinc-chloride solution may be 1.40 but the cut between float and sink actually may be made at 1.39. The difference begins to be significant with ¼-in. coal and is very important at 100-mesh. If calcium chloride is used for some of the determinations and zinc chloride for the others, there will be a break between the two lines.

Taking a dustiness index of 80 as the allowable maximum in the marketing of a dustless coal, it is found that Illinois No. 6 48-meshx13/16-in. coal treated when dry requires per ton more than 10 qt. of 200-sec. viscosity oil, 7 qt. of 600-sec. oil,

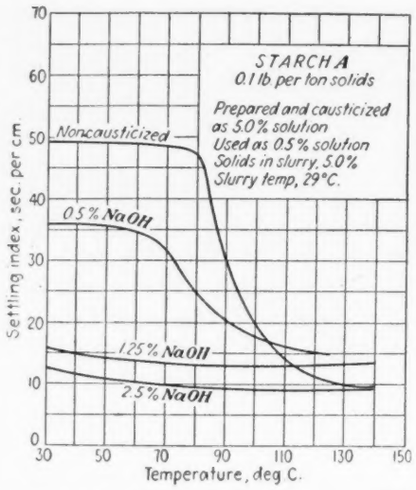


Fig. 1—Flocculation by starch as increased by temperature and strength of caustic soda.

5 qt. of oil-asphalt blend, 4.6 qt. of petrolatum or a little less than 4 qt. of a 480-sec. blend to give satisfaction after the coal has been stored a month, said J. M. Pilcher, for himself and R. A. Sherman, both of Battelle Memorial Institute. With wet coal the 200-sec. oil is clearly inadequate in any reasonable quantity; with the 480-sec. blend, 6½ qt. is required per ton; with petrolatum, only 6 qt., and with a 600-sec. oil, about 5 qt.

The higher the rank of the coal, the less oil needed to treat it effectively. All the oils give better results with Pocahontas No. 3 ¼x⅜-in. coal, as judged by the ability to hold the dustiness index to 80 after a week's storage, but the less viscous oils, with one exception, give the best results of any. Thus, 4.5 qt. of 100-sec. oil will serve with such coal to dedust a ton. Differences, however, between oils in this case are within the range of experimental error.

Oil treatment had no effect, favorable or unfavorable, on the ease of ignition of three coals as tested in a stoker, but it increased the smokiness of the fuel, either because the oil was cracked by the heat or because the caked fines smoked in burning. Plus 1-in. coke remaining after operation of the stoker increased slightly when the coal had been treated with oil, suggesting that larger coke trees might have been formed, though this action was not directly observable. Quantity of excess air used in combustion also increased.

Freezing of 0x1½-in. Island Creek coal was not prevented by oil treatment, but the frozen crusts were thinner and weaker, the more oil used. Oil treatment may reduce spontaneous combustion, but that has not been definitely determined. With Illinois No. 6 coal, a treatment with thick oil will reduce the adsorption of rain, but with Pocahontas No. 3 coal, if the treatment is not merely over the top of the pile, the oil will aid the adsorption. It seems to make the coal pile more porous.

In discussion, it was stated that treated coal will pack in the pipes leading to a pulverizing mill and give trouble until untreated coal is mixed with the treated. No trouble is experienced in the mill itself. It has been found that coal with a dustiness index of not more than 70 to 80 will give satisfaction around Pittsburgh, declared J. B. Morrow, vice-president in charge of operations, Pittsburgh Coal Co., but a 40 to 50 index is needed at some other points. Coal is too often sprayed unequally, giving cause for complaint, asserted J. E. Tobey, manager, fuels engineering division, Appalachian Fuels, Inc.

Oil can be used on stored coal for coke making, thus reducing the adsorption of water, declared C. J. Ramsburg, vice-president, Koppers Co. He used bunker C oil because he did not need an odorless product. All coals up to 83 per cent carbon, asserted E. S. Grumell, Imperial Chemical Industries, London, England, require twice as much oil for treatment as those containing over 83 per cent. Bunker C oils contain much sediment and water. They also vary greatly in character, being derived from a wide range of stills, declared H. B. Carpenter, Standard Oil Co. of New Jersey. He urged no one to attempt to use a product of so low a grade. Blends contain petrolatum, which is nothing but unrefined vaseline.

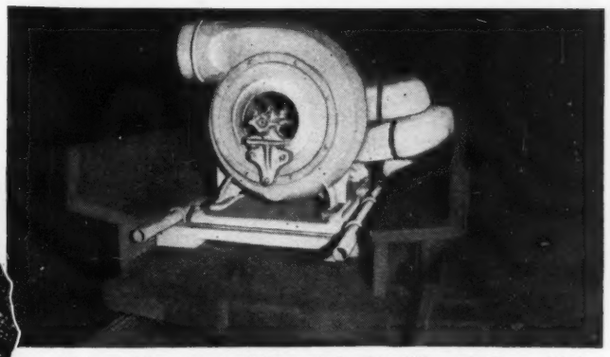
Difficulties have arisen in applying to Illinois coals E. Stansfield and K. G. Gilbart's equilibrium method of determining the inherent moisture in coals for their classification by rank. This method requires extrapolation, said F. H. Reed, presenting a paper in which he collaborated with O. W. Rees, also of the Illinois Geological Survey. The difficulty may arise from experimental error.

How Starch Will Settle Fines

Amylopectin occurs in the outer skins of starch grains; amylose within the skin. When the starch grains expand and rupture the skin, amylose is released and forms a colloidal solution, as is suggested by the fact that the flocculating properties begin to make their appearance at the rupturing temperature, announced K. B. Ray, Mine Safety Appliances Co., in briefing a paper by himself and G. R. Gardner, A. M. Meincke & Sons, both former chemists of the Pittsburgh Coal Co., for which company the studies were made.

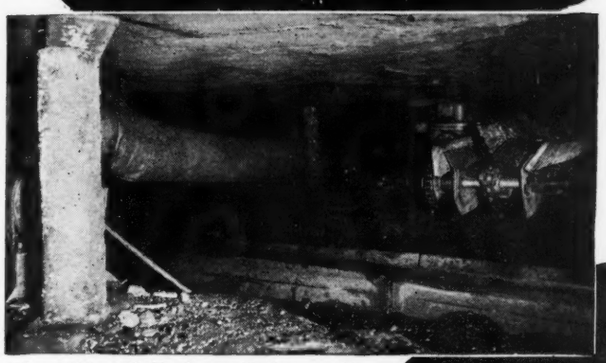
At higher temperatures, the amylopectin hydrolyzes to form soluble amylose and phosphoric acid, further increasing the flocculating properties. However, when further heated to about 145 deg. C., the starch begins to hydrolyze to dextrins, which disperse colloids instead of floccu-

SAVE VALUABLE SPACE IN LOW COAL BY USING "VENTUBE"



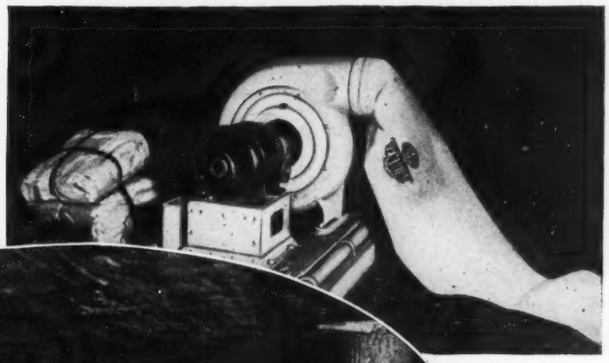
(*Above*) Five hundred feet of flexible "Ventube" ventilating duct can be loaded on a single mine car. It doesn't tie up equipment, as "Ventube" can be loaded and unloaded easily and quickly.

(*Below*) One man can install the entire "Ventube" system in a few hours. A small portable motor-driven fan and adequate tubing to reach the workings are all the equipment required.



(*Above*) "Ventube" takes up little space. It can go in and out of narrow, crooked passages—up and down steep inclines—turn sharp corners—can be suspended from supporting beams or pegs driven into the wall.

(*Below*) The entire system can be salvaged in a jiffy. Just take the "Ventube" down, roll it up and carry it to the next working. One man can easily carry 200 feet of "Ventube" in low coal.



"Ventube" keeps the air clear of smoke, dust and powder fumes. It carries adequate fresh air to the most remote working face, thereby making work easier and quicker.

MAKE THIS TEST: Install a few sections of "Ventube" rubberized ventilating duct in your most difficult low-coal working. The ease and speed with which it can be installed will convince you that "Ventube" saves time and money. Distributors strategically located for your prompt service. Write for complete information.

HEAVY DUTY DU PONT POWDER BAG

• This compact, roomy powder bag is made of the same material as is "Ventube." The extra-heavy, long-fibered Hessian cloth is both coated and impregnated with rubber that won't peel off. It is resistant to acid water, damp or dry rot, fungus, gases and concussion. Available in several serviceable sizes. Write for prices and information.

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E. I. DU PONT DE NEMOURS & CO., INC., "FABRIKOID" DIVISION, FAIRFIELD, CONN.

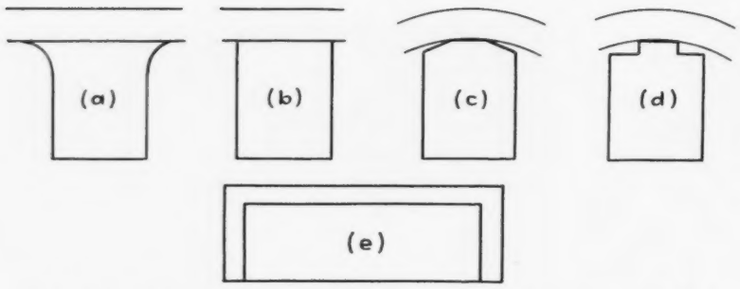


Fig. 2—Four pillar types, and one pillar hole or cut-through tested by P. B. Bucky.

lating them, and thus decrease progressively the flocculating activity of the starch still remaining.

Experiments have been made at Ohio State University, said another, with 4 per cent of sodium hydroxide; a photometer was used to measure the density of the floc. With 5 or 10 per cent of solids, the starch works well, according to C. P. Proctor, foreman, Champion No. 1, Pittsburgh Coal Co., but the percentages should not be allowed to run higher. Use of a mechanical thickener of suitable size is preferable to the use of starch, if room for it is available, added F. A. Jordan, Youngstown Sheet & Tube Co.

One of the achievements of the last ten years has been to reduce the cost of sampling, said Dr. Grumell. When the distribution of ash is ascertained correctly, it satisfactorily represents the distribution of sulphur and of the melting point of the ash. However, no quality can be quantitatively ascertained unless the water content has been estimated correctly. One per cent of water depresses calorific values as much as 1 per cent of ash.

Large Samples Cause Errors

The larger the sample, the more representative it will be, but large size is almost certainly rendered disadvantageous because of appreciable errors in the reduction of the sample and its excessive cost.

Errors in subdividing a gross sample may exceed the initial errors involved in the collection of the gross sample, continued Dr. Grumell. Variations are greater when coal is coned and quartered than when it is riffled, because of segregation by density and size. Crushers with spout samplers, unfortunately, are unreliable.

Sometimes, it will be found that instead of the Gaussian single-hump range of values, there will be two humps, if from a single mine come two entirely different types of coal, said D. R. Mitchell, head, department of mining engineering, Pennsylvania State College. These "bimodal" conditions reveal difficulties in meeting specifications that can be met only by excluding one type of coal or providing for a careful admixture of the two coals according to a fixed ratio.

A Bakelite model when stressed and viewed in polarized light will by its illuminated color bands and fringes show the quantity, direction and distribution of stress. Thus the stresses developed in a rock or in coal under similar conditions can be deduced, declared P. B. Bucky, Columbia University.

By varying the shape of the support, the stresses at different points of contact with the roof can be varied—they are never uniform. Maximum stresses seem to be the same whatever shape is chosen, but the location of them will be determined by the shape of the supporting surface. If the pillar flares out under the roof (*a*, Fig. 2), the flared portion will be stressed mostly heavily and may break down. Should the pillar be square at the top (*b*, Fig. 2), the edges will suffer the same maximum stress and may spall. If, however, the top of the pillar is beveled (*c*, Fig. 2) or benched with an arcwall cutter on either side (*d*, Fig. 2), the maximum stresses will be the same but restricted to a point near the pillar top and near the center of the pillar; hence, far less harmful. The moral is: Avoid brows along rib or face. Even a plumb rib has disadvantages.

A rib may be split safely and without weakening the pillar materially; at least if the coal is not taken out up to the roof. The fenders thus formed on either side (*e*, Fig. 2) will not be subjected to any undue weight, for the maximum stresses are found always near the top of the support, which in this case is left in place for sustenance.

Tests, made in a centrifuge, of the effect of artificial supports in longwall mining with a model so small that the actual dimensions of the working place it simulated would be 1,268 times as large in linear dimensions, showed that where there is no prop or crib support in front of the advancing face, rock falls occur either at the face or outby it, but never inby Where there are two rows of exceptionally strong props, one a "breaker" row and one a face-prop row, no rock fell at the working face but one occurred outby the breaker-prop line where a roof crack had already developed. With sand filling, no cracks were observable, though the longwall face was extended the equivalent of 539 ft. in 26.4-ft. intervals.

The best angle for the point of a bit for ordinary coal cutting is 13 deg., asserted C. L. Bowman, Bowdil Co., delivering an address for himself and Mr. Buch. For cutting pyrite, a 7-deg. point is preferable, but, for longwall, the angle should be 22 deg., because a point thus shaped keeps the machine in the face as it travels. Where there are hard materials such as pyrite, a core breaker should be used consisting of three conical burrs. These not only break off cores but bring out cuttings and keep the cut clean, provided the cutter's assistant does not let the chain sweep them back into the cut. One core breaker is placed on either side of the chain, one up and one down. Opinion as to greasing cutter chains runs about fifty-fifty, but most officials believe in greasing them at the end of the shift.

With thin coal, the advantage of dispensing with mine track by the use of rubber-tired tractors is greater than with thick coal, for, with a 30-in. seam, 402 track feet per 1,000 tons of production will be required, whereas only 128 track feet will be needed with a 96-in. seam, asserted J. H. Fletcher, Allen & Garcia Co., Chicago, Ill. (see Table I). With the thinner seam, 500 cars of two-ton capacity will have to be shifted, and with the 8-ft. seam only 200 five-ton cars. Because of the greater number of cycles per 1,000 tons, these and other ratios make a minute or two saved in moving equipment from room to room more vital to the thin-seam operator than to the operator with thick coal.

Table I—Factors in Cost of Producing 1,000 Tons in a 96- and 30-in. Seam

	96-in. Seam	30-in. Seam
Tracklaying, track feet	128	402
Cutting, ft.	400	1,665
Bug dust, sq. ft.	3,200	9,990
Rooms and sumping cuts	16	67
Drillholes	96	181
Loading, machine days	3	10
Car shifts	200 (5-ton)	500 (2-ton)
Cycles of operation with equipment shifts	16	67

Cost of Starting Mechanization

Experience of the Hanna Coal Co., as interpreted with present-day costs, showed, according to J. W. Boomer, chief mining engineer, and J. C. White, chief engineer, whose paper was presented by C. C. Hagenbuch, production engineer, that at a mine now not provided with mechanical loading the realization would be 93.75 per cent of cost on a ten-year life basis and 96.08 per cent of cost on a twenty-year life basis if the loading were fully mechanized.

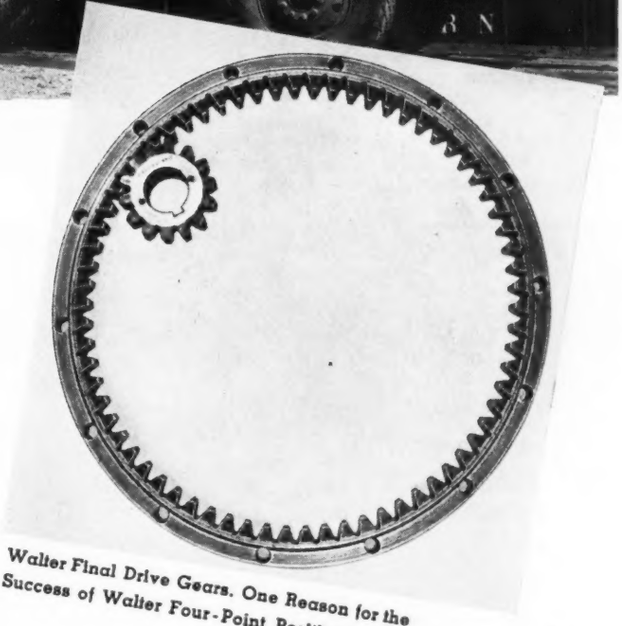
With hand loading the realization would be 95.77 per cent of cost if the present unmechanized loading were continued. The twenty-year life not being available, the realization would be less with mechanical loading than without it. With a short period of mechanization the cost of training crews makes operation less profitable unless the life of the mine will be long enough to amortize that cost. The authors declared this presentation to be merely the solution of a special case and a suggestion as to the correct way to analyze such mechanization problems which too often are regarded merely as loading problems without other connotations. Other conditions, however, might give an entirely different solution.

If men could be transferred from machine loading at another mine, the full advantages of such experience would be immediately available, said L. E. Young, vice-president, Pittsburgh Coal Co. Surely, said R. Dawson Hall, engineering editor, *Coal Age*, the mechanically cleaned coal would either increase the price on the sizes sold or enable the coal to find a wider or larger market. Why should all the costs of cleaning be charged to mechanical loading? With the Hanna methods there was no more concentration with machine than with hand loading; hence there were no savings in ventilation and in other auxiliary factors, said Mr. Hagenbuch.

Recounting his voyage around the world, J. C. Cosgrove said that Germany is ousting Great Britain as a source of coal in Brazilian industry; that South Africa has a central selling agency much

Every HEAVY duty truck should have a final drive like this

Walter Tractor Truck and Trailer as used in Coal Stripping Operations.



Walter Final Drive Gears. One Reason for the Success of Walter Four-Point Positive Drive.

The phenomenal success of the WALTER FOUR-POINT POSITIVE DRIVE SNOW FIGHTERS AND TRACTOR TRUCKS is due not to one distinctive feature but to several. Important among these is the unique type of final drive.

Four-wheel drives, of course, are expected to provide greater pulling and pushing power than rear-wheel drives. It is evident, therefore, that axle driving gears that may have sufficient capacity for rear drive service are not likely to be adequate for four-wheel drives. When axle gears are located in a hollow axle and between the wheels, their size is necessarily limited by the clearance requirements. The result is a compromise with efficiency.

Walter solved this problem by locating a large internal gear in each wheel so that ground clearance is not affected and the gear capacity is much greater than in other types. The principle of driving a wheel near the rim gives greater mechanical efficiency or less loss of power, and a much greater factor of safety without excessive weight.

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like those being set up in the United States, and that only in India did it seem that the coal operators were as crazily determined as ourselves to mine an excessive volume of coal at prices below cost. In British India, wives and children of miners have been legislated out of the mines, and rapid progress is being made in electrification.

Coal bootlegging is on the increase, though some have denied it, declared George Jones, Stevens Coal Co., Shamokin, Pa. About 13,000 men are mining coal to which they have no title; 4,000 are trucking it, and 2,000 breaking and sizing it. He estimated the tonnage in 1938 at 6,138,000. By actual check 72 per cent of the businesses and 60 per cent of the churches are buying bootleg coal in the vicinity of Shamokin. Prosecuting officials refuse to act, juries to indict, and sometimes when a justice of the peace sentences a bootlegger to jail, he is let out at the back door.

Bootleggers earn an average of about $2 a day; the coal at the "bootleg drop" costs $2.75. For 75c. truckers take it to bootleg breakers, which size and sell it to the truckers for $5 for egg, stove and nut; $4 for pea, and $2.50 for buckwheat. Operation of a bootleg breaker is a highly profitable speculation, netting an average of $75 to $300 a week. Without royalty payments, taxes on coal, compensation costs, power costs, social security payments or employment taxes, with all supplies, including timber, stolen from the company or from others, and with wages below union scales, they profitably sell coal $1 to $1.50 below market rates. Short weight also adds to profits.

Bootleg From Choice, Not Need

When the Stevens Coal Co. inserted advertisements for men in a local newspaper, none of the bootleggers or others applied for jobs; hence lack of work does not explain or excuse their nefarious practices. Of 7,700 bootleggers studied, 35 per cent were certificated or former miners, 42 per cent admitted receiving relief, 40 per cent were boys averaging about twenty years, but 90 per cent are "all right and good men."

High death rates accompany this sort of work. Boys, girls and women sometimes work underground or on the surface at these stolen-coal operations. Their mine holes are often a fire or water hazard and, on one occasion, when they were threatened with arrest or deprivation of mining opportunity by extension of legitimate mining, the bootleggers threatened to injure the employed miners with dynamite rolled down from the bootleg holes into the real mines below them. No action was taken against them until the mine inspector was convinced that specific bootleggers constituted a hazard to legitimate miners, but even then action was confined to those specific coal stealers.

About 92 per cent of the bootleggers are in the lower field and 70 per cent on the property of the Philadelphia & Reading Coal & Iron Co. On the property of the Stevens Coal Co. are 324 bootleg holes and 1,500 bootleggers. The company employs 800 men. Despite the stringency of the laws against undermining public roads, the bootleggers let such roads and railroads down with impunity, and Works Progress Administration men stand by to bring the road back to its original level. Two big hoisting engines, asserted R. Y. Williams, consulting engineer, Pottsville, Pa., have been ruined by bootleggers stealing coal and thus undermining the foundations, which occurred, said Mr. Jones, on the property of the Lehigh Valley Coal Co.

Complete automatic heating with anthracite in which the fire is not tended manually for months at a time is no longer merely an ideal but an accepted practice. Two or three hundred installations are actually known. There must be several hundred, declared H. J. Rose, speaking for himself and E. T. Selig, Jr. In some of these cases the dealer may have at long intervals to fill the bin in the cellar and someone may have to remove the ashes. Frequently, however, such service can be left for a whole year, as bins and ashpits are amply large. Big ashpits below the floor that need only infrequent emptying are to be found by the thousands.

Intrusions of molten matter that would have formed volcanoes instead of laccoliths if they had not spread laterally between the measures some 6,700 to 17,000 ft. below the surface of the ground caused the Crested Butte (Colo.) peat of Cretaceous age to turn into bituminous coal and anthracite, said E. C. Dapples. Probably the intruding material was at 900 deg. C., and the temperatures of the Ruby anthracite, resting 300 ft. above it, ranged from 290 to 350 deg. C. The lower figure is assumed because the lumens in the vegetable matter lost their resins apparently by evaporation which normally occurs at that temperature.

Parental influence keeps the sons of mining officials and employees from entering the coal-mining profession, asserted Dr. Mitchell. Investigation showed that, of 28 sons of mine executives and mine owners registered at the University of Illinois (1933-34), only three students chose any kind of engineering as a vocation; sixteen sons of miners out of 73 registered did likewise. Of the entire group of 101 men, only three became mining engineers. Of 182 sons of miners, mine executives or mine owners only six chose mining engineering in Pennsylvania State College in 1938-39. Only one out of 42 sons of persons in these three classifications took mining engineering at Ohio State University in 1939. However, declared Dr. Mitchell, sons of men of all conceivable kinds of occupations, high and low, enter mining schools for instruction.

There are shifts from generation to generation exhibited in all educational departments. Until a comparison is made, one cannot tell if this record presented by Dr. Mitchell is a matter of apprehension, responded F. A. Thomson, president, Montana School of Mines. It is remarkable how sons of physicians shift over into other occupations. Agriculturists show the greatest stability, asserted both Dr. Mitchell and H. E. Nold, professor of mining engineering, Ohio State University.

Better Engineers, More Safety

Are French general mine managers (they term them engineers) more careful of the lives and limbs of their men than American general managers? asked George S. Rice, consulting engineer, Washington, D. C. It would seem that they are, he replied, because, despite the high methane content of the coal and the treacherous roof, only about a fifth as many men are killed per thousand employed in France as in the United States. Our figure is 4.12 per thousand; Germany's, 2.03; Great Britain's, 1.34; Belgium's, 1.16, and France's, 0.94.

With that introduction Dr. Rice briefed a translation of a paper by J. Armanet, professor of mining, National Superior School of Mines, Paris, France, in which he explained that the three "superior" schools at Paris, St. Etienne and Nancy select their students by competitive examination, each limiting their numbers to 30 or 40 out of a large number of candidates. Training is not specialized. Yearly or quarterly students are examined orally, graded on their written work, penalized, if necessary—by being compelled to duplicate a year's study—or expelled, but in general all the students receive a diploma after three years and are ranked on their total marks.

If found of military aptitude, two years as second lieutenants in military service follows. Students come from all classes and are the sons of men in all lines of endeavor. Living, education and trips to mines cost from $270 to $405 a year, but loans and reductions in fees are provided for needy students. Practically all the graduates get positions on leaving military service, one-third being employed at mines. Graduates of superior mining schools do not become surveyors. Men rarely enter private service from governmental positions and cannot do so until they have filled a sufficient term of employment. Engineers spend their entire career with one company and are never compelled to resign.

Taxes on French mining companies, added Dr. Rice, are based on net proceeds, not on gross income. All land is leased by the State and no coal land is leased unless needed; hence French coal production escapes many of the heartaches which accompany mining in America.

Charge Inspectors Show Bias

Two State mine inspectors are charged with unfairness in dealing with mine foremen in a resolution adopted by the Mine Managers' Association of Iowa. The association, comprising nearly 100 foremen and assistants, accused the inspectors of being prejudiced in favor of union miners and of using their powers to persecute foremen and operators in disfavor with local unions.

President Re Stream Pollution

Passage of legislation dealing with pollution of streams, lakes and other waters was urged in a message by President Roosevelt to Congress on Feb. 16. The President said, in part: "It is my opinion that pending further experimentation with interstate and State enforcement activities, federal participation in pollution abatement should take the general form of establishing a central technical agency to promote and coordinate education, research and enforcement. On the basis of recent experience, it should be supplemented by a system of federal grants-in-aid and loans organized with due regard for the integrated use and control of water resources and for a balanced fed-

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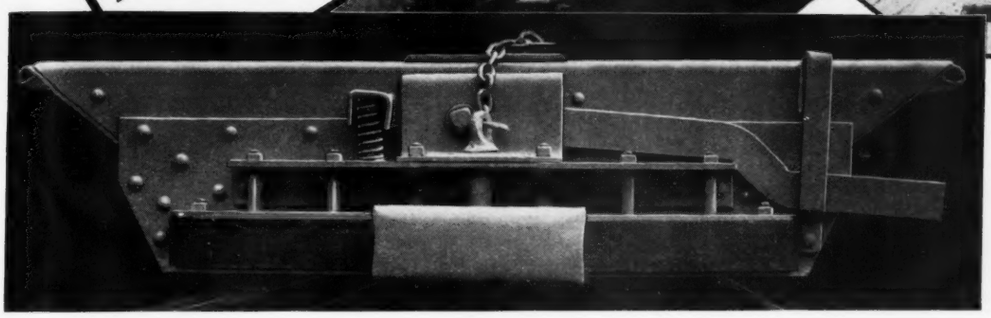

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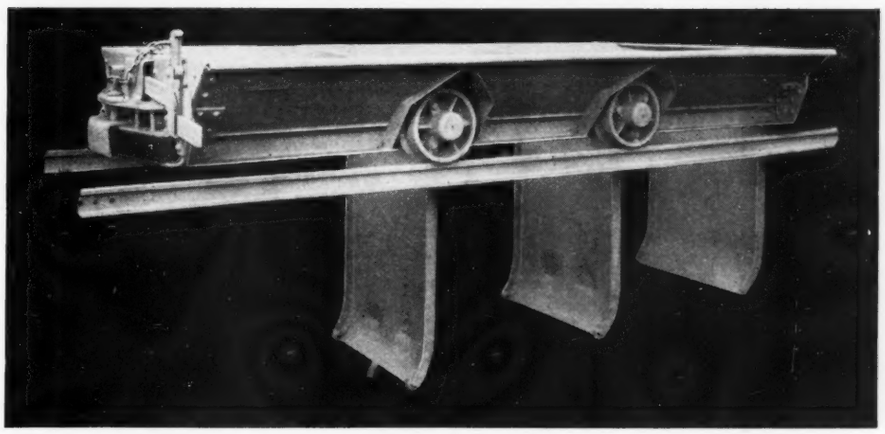

Have you checked them lately—your hauling and dumping costs from mine to tipple? Do this carefully, and then confer with us to see how much we can save you in cold cash. Modernize for economy. Capitalize on the continuous operation and extra capacity of the new S-D "Capacity Special" Automatic. This modern car is setting new tonnage records which, coupled with many new, economical operating factors, is definitely lowering costs. Also, it is unexcelled for ruggedness and durability. It is outstanding in minimum coal breakage results, because this remarkable car doesn't DUMP or DROP the coal, it LAYS the coal down gently, one door at a time. Take the first step towards saving thousands of dollars for your company. Send us a drawing of your present car . . . let us give you an estimate. Your requirements will be built into low cost, high production service. Drop us a line today for illustrated folder on "The S-D Capacity Special."

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Mine Cars, All Types — Trailers — Sheaves — Wheels

eral program for public works of all types. The time is overdue for the Federal Government to take vigorous leadership along these lines."

Accompanying the message was a complete report on "Water Pollution in the United States," prepared by the National Resources Committee at the request of the President. Mr. Roosevelt pointed out that this report indicates that an expenditure of nearly two billion dollars over a period of ten to twenty years

LETTERS
To The Editor

What Do You Think

I am employed as a mine official and would like to have comments on a roof condition that exists at our mine and a timbering system which we have had enforced. In our gob we set props 8 ft. from gob rib, then 3 ft. to the next prop in gob, also 3 ft. to the next; 2 ft. from prop to car. The right-hand rail is on sights and a prop 4 ft. from sight rail to prop on clearance side, then 4 ft. from clearance prop to rib, making a total of 28 ft.

Considerable trouble has been obtained with roof conditions in rooms 28 ft. wide. The roof breaks near the rib. Wherever the timber seems to be a distance from the ribs, it breaks quite often between the props on both sides of the road. I contend that the rib itself should act as the safety line of props on the clearance side; instead of the rib being 8 ft. from the sight rail it should be 4 ft. The timber in the gob—one prop should set not less than 18 in. from the rib and set very tight. Four props in the gob; the third prop from the gob rib should be staggered; all props set very tight. I find that where I set timber close to the ribs and well tightened we don't have so much trouble in it cutting the ribs.

This roof condition also cuts both ribs in the narrow headings. Some of the officials are of the opinion that this is a gas pressure; others say it is a water pressure. But, at many times when this happens and goes 10 or 12 ft. high, I never have found any dangerous quantities of gas, nor a large amount of water. This cut runs parallel with the entries. I am inclined to believe that there is a bed of limestone that, through the coal being removed, causes a settlement of the overhanging stratum; allows it to be relieved from its parting and becomes filled with a moisture and must expand. A simple idea of this is derived from the past: when they shot their coal with lime it would expand in the hole. I personally feel that there is a bed of limestone in the stratum which causes this condition.

Comments on this timbering system and the overhanging pressure which causes this condition will be greatly appreciated.

JOHN BUGGEY
Indiana, Pa.

"Double-Barreled"

The crux of today's economic problem lies in distribution, having a balanced relationship between all classes of producers that will permit a free flow of goods and services one to the other. The future of the coal industry is primarily dependent upon this freedom of exchange: an unhampered trade for coal users' goods and services, both in their respective outlets and with their suppliers. The coal industry has a double-barreled interest in railroad freight rates, the rates that unwisely hamper the exchange of goods and services, and, secondly, that reduce railroad traffic to cause a decrease in this industry's consumption of coal.

Railroad policy is to charge excess freight rates over costs, which include 5¾ per cent profit on capital investment based on reproduction value, on heavy industrial and farm products to pay deficits of other traffic: e.g., passenger trade.

Illustrative tables are given to show the rates per ton to ship coal and hollow tile by railroad, the approximate costs and the excess over costs that these products assume to help reduce the losses of other traffic.

The record of the railroads in the past fifteen years proves that this so-called policy of charging what the traffic will bear is not working out successfully in this industry's combating the evolution in transportation; and the repercussions of this philosophy have been to retard trade for every industry in the country. Table I suggests that the bituminous coal industry may bring about a reduction in the delivered price of coal by attacking this burden of 8 to 42c. a ton of unreasonable transportation charge. Table II shows that on long-haul tonnage of hollow tile, rates of 18.9 to 72.1 per cent over a cost which includes 5¾ per cent capital gain are levied—an eye-opening answer to the question of what has occurred to reduce the market for coal to the railroads.

Do not take this to be a plea to the railroads from depressed industries asking for favors—it is a presentation of additional facts to substantiate the case that the railroads require a 100 per cent overhauling to prepare the way for improved exchange of goods and services in this country. For the railroads to secure renewal of and additional governmental loans, reductions of employees' salaries, and modifications of governmental regulatory practices will not relieve the industry's long-standing problem of inadequate revenues. The issue demands a change of philosophy by the railroads to one favoring the public that is served.

The heavy-goods industries have been in difficult predicaments for many years, even prior to the general economic breakdown in 1929. It is the responsibility of the railroads to clean the deadwood out of their systems and to adjust the freight rates charged to heavy industries. This will clear a jam in the channels of distribution that will provide a major stimulus to renewed trade. Here is the nucleus of an economic program that the coal industry may wisely promote, a general plan to reopen the channels of commerce, a specific campaign for coal industry's own double-barreled gain. The economic problem is not one of ultimate wants, nor is it one of ability to produce —the issue is one of distribution.

VERNON S. LATIMER
St. Clairsville, Ohio

Table I—Bituminous Coal

From	To	Mileage	#Freight Costs Per Ton Incl. 5¾% Profit	Freight Rate Per Ton	Excess of Rate Over Cost Per Ton
Dun Glen, Ohio	Pittsburgh, Pa	58.0	$1.07	$1.49	$0.42
Willow Grove, O	Pittsburgh, Pa	78.8	1.16	1.44	.28
Willow Grove, O	Akron, Ohio	131.7	1.38	1.61	.23
Willow Grove, O	Cleveland, Ohio	165.0	1.54	1.84	.30
Willow Grove, O	Gypsum, Ohio	212.5	1.75	1.99	.24
Dun Glen, Ohio	Toledo, Ohio	236.0	1.86	1.99	.13
Dun Glen, Ohio	Union City, Pa	237.0	1.86	2.15	.29
Willow Grove, O	Cincinnati, Ohio	251.0	1.93	2.24	.31
Willow Grove, O	Continental, Ohio	256.0	1.95	2.12	.17
Dun Glen, Ohio	Detroit, Mich	292.0	2.10	2.20	.10
Dun Glen, Ohio	Fort Wayne, Ind	296.0	2.11	2.30	.19
Dun Glen, Ohio	Buffalo, N. Y	317.0	2.22	2.34	.11
Dun Glen, Ohio	Holly, Mich	324.9	2.25	2.50	.25
Dun Glen, Ohio	Black Rock, N. Y	326.5	2.26	2.34	.08

I.C.C. statement No. 3681 (File No. 28-A-12).
Bituminous coal averages 53.05 tons per car.

***Table II—Hollow Tile**

Mineral City, Ohio, to	Mileage	#Freight Costs Per Ton incl. 5¾% Profit	Freight Actually Charged Per Ton	Excess Charges Per Cent Over Cost
Pittsburgh, Pa	103.0	$1.49	$2.15	44.3
Toledo, Ohio	174.0	1.85	2.20	18.9
Detroit, Mich	230.0	2.08	2.53	21.6
Ft. Wayne, Ind	235.0	2.08	2.75	32.2
Rochester, N. Y	323.0	2.49	3.30	32.5
Harrisburg, Pa	348.0	2.62	4.51	72.1
Syracuse, N. Y	404.0	2.85	3.85	35.0
Baltimore, Md	432.0	3.02	4.51	49.3
Philadelphia, Pa	452.0	3.12	4.73	51.6
Utica, N. Y	457.0	3.12	4.29	37.5
New York City	542.0	3.52	5.17	46.8
Stamford, Conn	589.0	3.70	5.61	51.7
Springfield, Mass	653.0	3.98	5.61	40.9
Boston, Mass	751.0	4.42	5.61	26.9

* Release of Cloyd W. Miller, Mineral City, Ohio, Oct. 22, 1938.
# I.C.C. statement No. 3681 (File No. 28-A-12).
Hollow tile averages 36.78 tons per car.

by a combination of public and private agencies will be necessary to construct the works necessary to abate the more objectionable pollution. "If this construction work is to continue at a substantial rate, and if the necessary research, education and enforcement activities are to be carried out most effectively." the President added, "the Federal Government must lend financial support and technical stimulation."

Heating Engineers Discuss Coal Problems

Prof. Frank B. Rowley, director of the engineering experiment station of the University of Minnesota, was awarded the American Society of Heating and Ventilating Engineers' medal for "distinguished scientific achievement in heating, ventilating and air conditioning" at the 45th annual meeting of the society, in Pittsburgh, Pa., on Jan. 25. The award to Prof. Rowley was for his outstanding work as teacher and research investigator in the field of heat transmission, insulation, the effect of moisture condensation on building materials and dust elimination.

Among the twenty technical papers presented at the meeting were: "Selection of Solid Fuels From the Viewpoint of the Small Consumer," P. Nicholls, U. S. Bureau of Mines, Pittsburgh, Pa.; "Performance of Stoker-Fired and Hand-Fired Warm-Air Furnaces in the Research Residence," A. P. Kratz, S. Konzo and R. B. Engldahl, University of Illinois; "Heat Transfer in Storage Water Heaters," D. W. Nelson and A. A. Rosenberg; "Small Stokers," P. A. Mulcey, Anthracite Industries Laboratory, and R. A. Sherman, Battelle Memorial Institute; "Smoke Abatement—Where to Draw the Line," H. B. Meller; "Smoke-Producing Tendencies in Coals of Various Ranks," H. J. Rose, Mellon Institute, and F. P. Lasseter.

Opposes Shifting Activities Of Bureau of Mines

The work of the U. S. Bureau of Mines and the U. S. Geological Survey came in for warm commendation at the annual meeting of the American Mining Congress, held Jan. 27 at the Mayflower Hotel, Washington, D. C. The congress registered disapproval of any impairment of their functions, however, particularly condemning any alteration of the duties of the Bureau of Mines which would divert it from a broad program of research in safety and health problems to work of inspection and control, which it said should be properly handled by State Governments. The members also registered strong opposition to the pending treaty with Canada providing for construction of the Great Lakes-St. Lawrence waterway and huge hydro-electric power developments. It was pointed out that the project would result in a loss of markets for millions of tons of coal and other products.

All officers of the congress were re-elected, these including: president, Howard I. Young, president, American Zinc, Lead & Smelting Co.; first vice-president, D. D. Moffat, vice-president, Utah Copper

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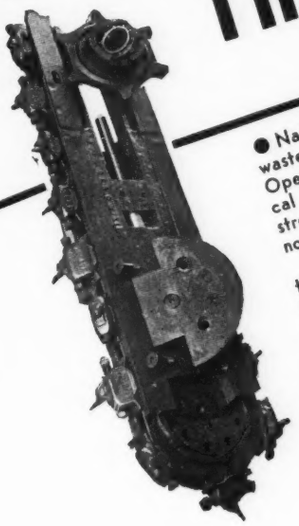

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Write for bulletin 26.

Deister Multirap Vibrator for screening the finer sizes of coal.
Write for Bulletin 24.

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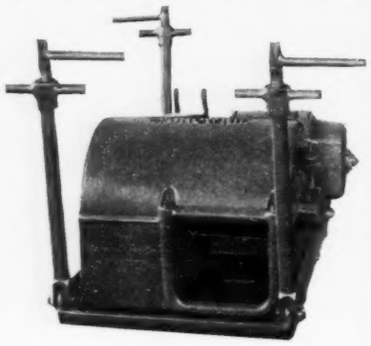

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Co.; second vice-president, E. B. Greene, president, Cleveland-Cliffs Iron Co.; third vice-president, D. A. Callahan, and secretary, Julian D. Conover. Among the directors reelected are J. D. Francis, president, Island Creek Coal Co., and W. J. Jenkins, president, Consolidated Coal Co.

Waste of Resourses Assailed By President Roosevelt

Calling attention to the fact that legislation affecting coal, oil, natural gas and water power would expire at the end of this fiscal year and that other similar measures would terminate after a few years, President Roosevelt sent a message to Congress on Feb. 16 urging consideration of methods of conserving and utilizing the nation's energy resources. Though the country's power resources are not inexhaustible, the President wrote, waste in use and production is permitted, and apparent economies today mean in some instances that future generations will carry a burden of unnecessarily high costs and be forced to substitute inferior fuels.

National policies, said Mr. Roosevelt, must recognize the availability of all our vital resources, their location with respect to markets, and consider transport costs, technological developments to increase efficiency of production and use; the use of the lower grade coals; and the relationship between the increased use of energy and the general economic development of the country. The time has come, he added, to devise a policy treating the energy resources as a whole rather than individually. Since it cannot be done overnight, it is necessary to recognize that each has a bearing on and affects the others.

An accompanying report from the National Resources Committee stated that "the obvious fields of remedy with respect to conservation of energy resources seem to lie (1) in promoting greater efficiency in the production of the fuel resources from the standpoint of recovery; (2) in promoting greater economy in the use of fuels; and (3) in placing a larger share of the energy burden on lower grade fuels and water power."

Fire Razes River Tipple

Fire on Feb. 6 destroyed the river tipple of the Kanawha & Hocking Coal & Coke Co., near Charleston, Wa. Va. Company officials estimated the loss at more than $15,000.

Obituary

RAYMOND J. AMES, 62, vice-president in charge of sales of the St. Louis & O'Fallon Coal Co., St. Louis, Mo., died of pneumonia Feb. 13 at St. Mary's Hospital in that city. He had been in the wholesale coal business for 40 years.

JOHN H. MANDT, 42, president, Warfield Coal Co., Beauty, Ky., died at Estill, Ky., on Jan. 24 from injuries suffered in an automobile accident.

DAVID L. HANSEN, 53, president of the American-Independent Coal Co., Florence, Colo., died Jan. 21 in his office from a pistol wound in his right temple. A coroner's jury pronounced his death accidental. He also was a member of District 17 Bituminous Producers' Board under the Guffey-Vinson Coal Control Act.

J. F. WHITE, 71, State mine inspector in southern West Virginia for 21 years, died Jan. 27 in a Logan (W. Va.) hospital of a heart ailment.

LEON P. RICHARDS, 45, mining engineer for the last eighteen years for the United Pocahontas Coal Co. at Crumpler, W. Va., died Jan. 26 at Bluefield Sanitarium a victim of cancer.

O. & W. Mine Mechanization Under Consideration

In connection with pending reorganization plans of the New York, Ontario & Western Ry., consideration is being given by officials and bondholders of the road and by the Reconstruction Finance Corporation to mechanization and coordination of anthracite mines in Pennsylvania affiliated with it, according to correspondence on file with the Interstate Commerce Commission. E. G. Buckland, president of the railroad, wrote to Commissioner B. H. Meyer, chairman of Division 4, requesting that hearings on the company's plan for reorganization be deferred until interested parties had fully considered the mechanization plan, and stating that "engineers report a probability of 30,000,000 tons of minable anthracite at the rate of 2,000,000 tons per year which can be made available."

Furthermore, he said, "even at present anthracite prices, if the mines are so mechanized and combined, the resulting efficient and economical operation would produce anthracite veins which now cannot be profitably mined . . . This proposition is under serious consideration by the bondholders, and I understand the trustee and bondholders are intending to ask the RFC to cooperate to the end that not only may the revenue of the debtor be materially increased for a period of at least fifteen years but also that a previous loan of $650,000 to the Scranton Coal Co. by the RFC may in whole or great part be paid."

Frederic E. Lyford, trustee of the road, also wrote to Commissioner Meyer on the same date as Mr. Buckland—Jan. 21—agreeing to the importance of the mechanization plan and expressing the belief that present negotiations for agreement on the plan could not be successfully concluded until April 1.

In a reply to Mr. Lyford on Jan. 28, Commissioner Meyer stated that the matters discussed in the Lyford and Buckland letters would be considered in fixing a date for the hearing.

Alabama Truck Mines Organize

The Alabama Truck Mine Operators' Association was organized at Jasper, Ala., Feb. 15 with a membership of 150, who cemented their ranks for a finish fight against a bill pending in the Legislature for regulation of wagon mines.

"Small mine operators are unable to meet the requirements of the bill, and it

will force them out of business," said Carl A. Elliott, counsel for the association. He said the organization is sympathetic to workmen's compensation insurance provided a plan can be devised to enable small operators to obtain it "on a basis that they can pay."

Coal Interests Combat Pipe-Line Plan

Briefs opposing the application of the Kansas Pipe Line & Gas Co. for an order disclaiming jurisdiction or a certificate of public necessity to construct and operate a natural-gas pipe line from Kansas to Minnesota have been filed with the Federal Power Commission by the National Coal Association and the Truax-Traer Coal Co., jointly, and the Montana-Dakota Utilities Co.

The coal interests contend that unless the term "market" in the Natural Gas Act is synonymous with "town" or "community," it must be held that the Commission has jurisdiction; they maintain that Congress certainly used the term "market" in its commonly accepted and broad sense. Arguing that it is apparent from the evidence that "the whole project depends upon its ability to displace coal for industrial use," the coal operators urge that the Commission assert jurisdiction and proceed to hearings upon the request of the Kansas company for a certificate of public necessity and convenience.

If any certificate is granted, the coal producers contend, it should be granted to the North Dakota Consumers' Gas Co. and not to the Kansas company if the Commission is to be governed by consideration of lower rates to the public, conservation of gas resources and comparison of costs of a pipe-line system. An application by the North Dakota company is now pending before the Commission to build such lines (*Coal Age*, February, p. 100).

The Northern Natural Gas Co., which already serves the Twin Cities, originally invoked the jurisdiction of the Commission in the Kansas company application, but, following a hearing on Jan. 16 and 17, reversed its position and no longer desires to intervene in opposition to the Kansas company project.

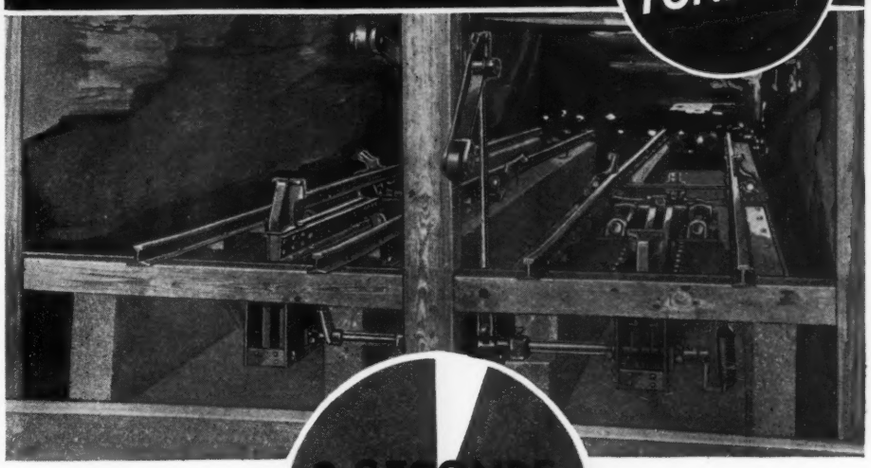
New Preparation Facilities

COSTANZO MINING CO., Wheeling, W. Va.: Contract closed with Jeffrey Mfg. Co. for one Jeffrey washery unit complete with jig, dewatering screen, clarifying tank and water-circulating system; capacity, 75 tons per hour of 2½x½-in. coal.

HAMMOND COAL CO., Girardville, Pa.: Contract closed with Wilmot Engineering Co. for complete new steel breaker including crusher rolls, Keystone rivetless-chain sizing screens; preparation equipment to comprise Wilmot Hydrotators and hydro-separators; capacity, 1,500 tons of prepared anthracite per shift. To be in operation June 1.

HUDSON COAL CO., Pine Ridge colliery, Parsons, Pa.: Contract closed with Wilmot Engineering Co. for Wilmot Hydrotator to prepare 25 tons of rice coal per

NOLAN PATENT
AUTOMATIC CUSHIONED BUMPER STOP CAGERS
for BETTER TONNAGE



3 SECONDS Guaranteed CAGING TIME

Save Time
Save Labor
Save Cars
Save Coal

THE Nolan Method of car control at the hoisting cage keeps coal moving smoothly, safely and with clock-like precision—at a point which is frequently the "bottle neck" of the entire mining operation.

Nolan Automatic Cushioned Bumper Stop Cagers—for shaft bottom and intermediate levels—are unquestionably the most practical, safe and money-saving units ever developed for the caging operation. Used with the Nolan Patented Car Lock and Release for Cages, the loaded car will displace the empty and be locked in hoisting position in *three seconds*—without shock or damage to car wheels, journals or axles—or to the caging equipment. Equally efficient with all types of Car Dumpers.

When equipped with the air-cushioned equipment shown below, Nolan Bumper Stop Cagers positively eliminate all coal spillage resulting from top loading or cribbing. The air-cushion cylinders exert a gradual retarding effect, bringing the trip to a gentle stop—without loss of the high speed caging characteristics of the machines.

If you are interested in Caging Equipment, Rotary Dumps or Car Control Equipment of any type, we invite your inquiries.

The MINING SAFETY DEVICE CO.

Mine Car Control Specialist for More Than Twenty-five Years.

BOWERSTON, OHIO.

NOLAN AIR-CUSHION UNIT

hour. Additional facilities to equipment now in operation.

NEW RIVER Co., Mount Hope, W. Va.: Contract closed with Jeffrey Mfg. Co. for rescreening plant; equipment includes 4x 10-ft. Jeffrey-Traylor vibrating screen with Jeffrey-Heller piano-wire screen deck; also conveying and elevating equipment for handling coal to and from rescreening plant; capacity, 100 tons per hour screening at ¼ in.

To Replace Burned Tipple

Plans for a new tipple to replace the one recently destroyed by fire at Marstellar, Pa., are being made by the Pennsylvania Coal & Coke Corporation. The new structure will involve an outlay of close to $50,000 with equipment. The main office of the company, of which Mark W. Potter is president, is in New York City. A. L. Hunt is general manager, with headquarters at Cresson, Pa.

Industrial Notes

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC., has closed an agency agreement whereby the United Iron Works Co., Pittsburg, Kan., will handle its products in Missouri, Iowa, Kansas, Oklahoma and Arkansas.

VANADIUM CORPORATION OF AMERICA has appointed John W. Lohnes as assistant to the general manager of sales. For the last three years Mr. Lohnes has been attached to the company's Chicago office; prior to his association with Vanadium, he was with the Carnegie-Illinois Steel Corporation at Chicago. His headquarters will be at the company's main office, in New York City.

WEST VIRGINIA RAIL CO., Huntington, W. Va., has appointed J. B. Haskell as sales manager of its rail and trackwork division. For the last fifteen years he has been superintendent of the frog and switch department.

WESTINGHOUSE ELECTRIC & MFG. CO. has made Frank Howell Stohr manager of all industry sales departments, with headquarters at East Pittsburgh, Pa. R. A. Neal has been appointed assistant to vice-president, and C. F. Lloyd as manager of the central sales department. L. B. McCully succeeds Mr. Stohr as manager of the transportation and generator division.

NORTHERN EQUIPMENT CO., Erie, Pa., has placed Harry H. Weining in charge of all research projects concerned with the Copes system of boiler feed control and allied equipment. Assisting him will be Francis W. Bunting and William E. Veenschoten.

AMERICAN CHAIN & CABLE CO., INC., has appointed R. E. Greenwood as Chicago district sales manager, American Chain Division, with headquarters at 400 West Michigan Ave. He succeeds G. B. Kutz, who has been transferred to York, Pa., as assistant to the general manager of sales. R. C. Brenzier has been appointed Philadelphia (Pa.) district sales manager, with headquarters at Second and Diamond Sts., where he succeeds Mr. Greenwood.

Lower Midwest-Lake Rates Via Chicago Stayed

New proportional rate schedules on bituminous coal shipped from Midwest mines to Chicago for transshipment as lake cargo, filed by railroads to become effective on Feb. 4, were suspended by the Interstate Commerce Commission on Feb. 3. The proposed rates were set aside until Sept. 4, pending investigation as to their reasonableness, a hearing being set for March 13.

The new schedules were to supersede present track delivery rates to Chicago on lake cargo coal shipped from Clinton and Linton, Ind.; southern Illinois and western Kentucky, being somewhat lower than prevailing rates. The roads affected are the Chicago & Eastern Illinois; Chicago, Burlington & Quincy; Cleveland, Cincinnati, Chicago & St. Louis; Chicago, Milwaukee, St. Paul & Pacific; Illinois Central and Missouri Pacific.

The proposed proportional rates are: From Clinton, $1.25 per ton (instead of $1.65); Linton, $1.32 (instead of $1.75); southern Illinois, $1.55 (instead of $2.05); western Kentucky, $1.90 (instead of $2.40).

Glen Morrison Mine Reopens

Reopening of the Glen Morrison mine of the Morrison Coal Co., near Pineville, W. Va., was announced late in January by A. W. Laing, vice-president of the company. The operation, which had been closed since last October, said Mr. Laing, would reach a production of 40,000 tons per month shortly, affording employment to 350 men.

Hillman Mine Leased

Control of the Patterson mine of the Hillman Coal & Coke Co., Elizabeth, Pa., was taken over in the first week of February by Grant Sampson, of Donora, Pa., who has worked mines up the Monongahela Valley. The new producer has taken the property under lease from the Hillman company, and expects to resume work soon.

Compressed-Air Safety Code

A safety code for compressed-air machinery and equipment has been approved by the American Standards Association and is being published by the American Society of Mechanical Engineers. The code is designed to reduce accidents resulting from the wide use of compressed air for mining machinery and numerous other industrial applications. The booklet, comprising nine pages, may be obtained from either organization for 30c.

Trustee for Illinois Company

Federal Judge Fred L. Wham has named Richard W. Gass, secretary of the Belleville (Ill.) Chamber of Commerce, as trustee for the Southern Coal, Coke & Mining Co., which operates mines in the Belleville district. Petition for a receiver, under the corporate reorganization section of the bankruptcy act, was filed by seven creditors of the company. Liabilities are listed at $260,000, but no mention is made of assets of the corporation, which was capitalized at $1,000,000 when it was formed, 40 years ago.

Trade Literature

BALL BEARINGS—New Departure Division, General Motors Corporation, Bristol, Conn. Booklet R26 is the 1939 edition of New Departure's interchangeability tables showing the various applications of all makes of anti-friction bearings.

BEARING METAL—Joseph T. Ryerson & Son, Inc., Chicago. Eight-page bulletin explains the physical structure of Glyco babbitt that gives it the prime characteristics of good bearing metal. Included are recommended applications for the various grades of Glyco carried in stock.

DIESEL-DRIVEN COMPRESSOR — Ingersoll-Rand Co., Phillipsburg, N. J. Bulletin Form 3072 (16 pp.) describes the "HVO" unit for use in independent or isolated compressor plants or when existing power facilities are overloaded. The company recommends it particularly for small mines, citing many advantages.

DRILL—Ingersoll-Rand Co., Pittsburgh, Pa. Bulletin Form 2489 (4 pp.) sets forth the special features, also describing the parts, of the JA-35 Jackhamer. Illustrations show the unit at work under a variety of conditions.

DUST ELIMINATION—Pangborn Corporation, Hagerstown, Md. Bulletins 2034 and 2035 (8 pp. each) cite some of the evil effects on machinery, workmanship and merchandise caused by dust. Increased production and lower maintenance costs are claimed through installation of the company's dust collectors.

EARTH DRILLS—Buda Co., Harvey, Ill. Bulletin No. 868A (8 pp.) describes the Buda-Hubron unit for drilling holes up to 42 in. in diameter as deep as 50 ft. Illustrations show its wide variety of uses.

ELECTRIC HOISTS—Yale & Towne Mfg. Co., Philadelphia, Pa. Catalog W-38 and Bulletin P-388 describe the Cable King wire-rope hoist, with descriptive specifications, dimensional diagrams and dimensional data.

FLEXIBLE METAL HOSE AND TUBING—Flexible Metal Hose & Tubing Institute, New York City. "Fact Book" presents a complete factual story of these products, graphically portraying their usefulness in meeting many difficult design, construction and maintenance problems.

MINE-CAR DUMPING DEVICES—Mining Safety Device Co., Bowerston, Ohio. Six-page folder shows the advantages and special features of Nolan rotary and gravity car dumpers; important details are illustrated.

MOTOR REPAIR EQUIPMENT—Ideal Commutator Dresser Co., Sycamore, Ill. Form No. BR. 938 (16-pp. folder) describes and pictures new products for reducing maintenance costs, including commutator

and slip-ring resurfacers, precision grinders, power-driven undercutter, portable electric cleaners, coil-winding equipment, soldering tools, voltage regulators, wire strippers and fuse specialties. The Ideal "Select-O-Speed" transmission is featured.

PUMPS—De Laval Steam Turbine Co., Trenton, N. J. Catalog B-5 (36 pp.) cites the distinctive features and outstanding advantages of single-suction multistage pumps. Halftones, charts and diagrams are used in profusion.

PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-423-B5 gives specifications and stresses advantages of Figure 1863 vertical triplex single-acting power pumps; size and rating tables, as well as detail illustrations, are included. Bulletin W-450-B19C depicts features of types QE and QAE deep-well turbine pumps for economical water supply.

RAIL CROSSING—American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill. Six-page folder stresses the advantages in long life, low maintenance and smooth riding of AMSCO manganese "depth-hardened" crossings.

ROTARY PICK BREAKER—United Iron Works Co., Kansas City, Mo. Bulletin No. 103 shows how the "United" pick breaker sizes mine-run or prescreened coal to any desired size without excessive degradation and fines.

SCREW CONVEYORS—Chain Belt Co., Milwaukee, Wis. Catalog 334 (64 pp.) contains information on screw-conveyor installations, selection of units, capacity charts, specifications, etc.; also a complete listing of Rex cast and Rex Salem type elevator buckets. Rex bucket elevators and conveyors for coal and ash handling also are described and pictured in Bulletin 331 (16 pp.).

SEMI-PORTABLE AIR COMPRESSOR—Sullivan Machinery Co., Michigan City, Ind. Bulletin A-23 describes the WN-102 unit, giving complete specifications; tables showing the number of tools that can be operated from each of the three sizes; pictures of direct-connected and V-belt-driven models with gasoline, diesel and electric drive; and numerous illustrations showing the large size at work at mines, etc. Phantom views and parts pictures show details of construction and interesting features.

SHOVEL AND DRAGLINE—Harnischfeger Corporation, Milwaukee, Wis. Bulletin X-50 gives comprehensive information on the design, special features and operation of the P&H Model 1055 shovel and Model 1055-LC dragline. Features stressed are P&H chain crowd, double-cut gears, large-diameter extra-wide drums, split-second power clutches, power dipper trip, double-sprocket drive, chrome-vanadium jackshaft and alloy-steel car body.

SKULLGARD WELDING SHIELD—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin No. CE-6 shows the advantages in comfort and efficiency of this combination unit on all kinds of welding jobs.

SLING CHAIN—Joseph T. Ryerson & Son, Inc., Chicago. Four-page bulletin explains the advantages of the new nickel-molybdenum alloy used in Taylor alloy steel heat-treated chain. In addition to a "safe-working loads" table and a speci-

Bound For a California Gold Mine

This 6-ton G-E mine locomotive is for the Carson Hill Gold Mining Corporation. Its extended trolley socket enables it to do both tunnel and surface work

—but first it must make good on this indoor proving ground

THIS trolley-type locomotive will haul pay dirt a mile and a quarter to the mill.

As in the case of every G-E mine locomotive, it first goes through a series of rigorous performance tests. Here it's running on the indoor test blocks. Testers check motor rotation, controller steps, insulation, freedom of moving parts, and other conditions. Motors, controllers, and other electric equipment are tested individually before the locomotive is assembled.

The final test—and by far the most important—is actual service. G-E mine locomotives—more than 10,000 of them since 1887—have come through with flying colors. A G-E representative will tell you how the new G-E locomotives can help you save on haulage costs. Call or write the nearest G-E sales office. General Electric, Schenectady, New York.

DATA ON THIS LOCOMOTIVE

Weight—6 tons
Speed—7 miles per hour
Drawbar pull—3000 lb
Voltage—500 volts
Track gage—36 inches
Wheelbase—46 inches
Length—156 inches
Width—61 inches
Height—36 inches
Control—drum type

BUILDER OF MINE LOCOMOTIVES SINCE 1887

GENERAL ELECTRIC

290-9

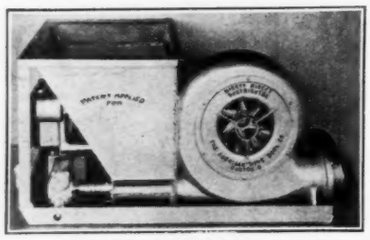
No excuse for not Rock Dusting Now

MIGHTY MIDGET

PORTABLE

Rock Dust Machine

Use it until you can purchase a larger machine. Generous allowance on "Trade In"



PATENT APPLIED FOR

MIDGET IN SIZE AND PRICE

but Powerful in Performance

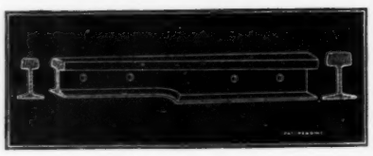
Designed for transporting on belt conveyors. Can be handled on car, pushed on truck or cart or carried by two men. More economical than larger machines for room dusting. Has distributed in actual mine dusting, four tons in 4½ hours including lost time. Write for specifications, price and demonstration at your mine. No expense or obligation on your part. The performance and price will pleasantly surprise you.

AMERICAN MINE DOOR CO.

2057 Dueber Ave., Canton, Ohio

BETTER and SAFER

MINE RAIL SIZE REDUCTION



Portable's **TRANSITION RAILS**

Are perfect equipment for smooth, safe transition from one rail size to another. The even taper provides for strength and smoothness, and the 26 inch length makes for easy handling. No "rights" or "lefts" are required.

Standard fishplates or angle-bars are used to make the joints between the transition rail and other rails. Bonding is accomplished by means of a continuous bond around the rail.

PORTABLE'S TRANSITION RAIL is less expensive and more efficient than offset plates or step-chairs. Investigate its advantages.

Standard stock sizes available for immediate delivery: 60# to 45#; 60# to 40#; 60# to 30#; 60# to 25#; 40# to 25#. Other sizes on request.

WRITE FOR NEW DESCRIPTIVE LITERATURE

Portable Lamp & Equipment Co.

72 FIRST AVENUE PITTSBURGH, PA.

Cool Caps and Hats Electric Cap Lamps Safety Lamps
Safety Shoes Goggles Respirators

fication chart, complete data are given on all chains carried in stock.

TRACTORS—Caterpillar Tractor Co., Peoria, Ill. Booklet Form 4757 (32 pp.) gives operating costs and specifications of the 25-hp. diesel D2 tractor. Features of its engine, transmission and track construction are shown in pictures and explained in concise text. Capacities and the unit's place in industry are given through action pictures, owners' statements, etc. Form 5039 is a 32-pp. composite catalog covering track-type tractors, auto patrols, blade graders, elevating graders, terracers, diesel engines, diesel electric generators, etc.

TRACTOR TRUCKS—Walter Motor Truck Co., Ridgewood, L. I. Folder T-50 stresses the advantages of four-point positive drive, with pictures showing the trucks at work under severe operating conditions.

VERTICAL TRIPLEX PUMPS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin W-423-B5 gives specifications and advantages of Figure 1863 vertical triplex single-acting power pumps; size and rating table, as well as detail illustrations, are included. Bulletin W-450-B19C depicts features of Types QE and QAE deep-well turbine pumps for economical water supply.

VIBRATING SCREENS — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 1478-B (12 pp.) shows, largely through illustrations, the desirability of low-head units in effecting savings where reduced headroom results in reduced building height and reduced length of elevators and conveyors.

WIRE ROPE—Broderick & Bascom Rope Co., St. Louis, Mo. New catalog (96 pp.), devoted especially to wire rope for mining, gives data as to stresses in suspended cables and in shaft and incline ropes, and specific recommendations as to grades and construction of rope for various types of strip shovels, draglines and other equipment. A leaflet illustrates a few types of Murray plaited safety slings, with tables showing the comparative strength of plaited slings, regular wire-rope slings and chain slings.

Coal-Mine Fatality Rate Again Recedes

Accidents at coal mines of the United States caused the deaths of 76 bituminous and 17 anthracite miners in December last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 36,230,000 tons, the dath rate among bituminous miners was 2.10 per million tons, compared with 2.42 in the corresponding month of the preceding year.

The anthracite fatality rate in December last was 3.80, based on an output of 4,471,000 tons, as against 3.79 in December, 1937.

For the two industries combined, the death rate in December last was 2.28, compared with 2.63 in the same month of the year before.

Fatalities during December last, by causes and States, as well as comparable rates for the years 1937 and 1938, are shown below:

UNITED STATES COAL-MINE FATALITIES IN DECEMBER, 1938, BY CAUSES AND STATES

State	Underground: Falls of roof	Falls of face	Haulage	Gas or dust explosions	Explosives	Mining machines	Mine fires	Other causes	Total underground	Open-cut and Surface: Mine cars	Railway cars	Falls of persons	Machinery	Other causes	Total surface	Grand total
Arkansas	1	1	..	....	..	....	..	..	2	..	..	....	..	..	..	2
Colorado	2	..	..	....	..	1	..	..	3	..	..	....	..	..	..	3
Illinois	7	..	..	1	..	....	..	..	8	..	1	....	1	..	2	10
Indiana	..	..	1	....	..	....	1	..	2	..	..	....	..	..	..	2
Kentucky	6	1	2	....	..	....	..	..	9	..	..	....	..	..	..	9
Missouri	1	..	..	....	..	....	..	..	1	..	..	....	..	..	..	1
Montana	..	..	..	....	..	....	..	..	....	..	..	....	2	..	2	2
North Dakota	1	..	..	....	..	....	..	..	1	..	..	....	..	..	..	1
Ohio	4	..	..	....	..	....	..	..	4	..	..	....	..	..	..	4
Oklahoma	..	..	..	1	..	....	..	..	1	..	..	....	..	..	..	1
Pennsylvania (bit.)	3	2	1	....	..	1	..	1	8	..	..	....	..	1	1	9
Tennessee	2	..	..	....	..	....	..	..	2	..	..	1	..	..	1	3
Utah	..	1	..	....	..	....	..	..	1	..	..	....	..	..	..	1
Virginia	2	..	1	2	..	1	..	..	6	..	..	....	..	..	..	6
Washington	..	..	..	....	1	....	..	..	1	..	..	....	..	..	..	1
West Virginia	10	1	4	2	..	....	..	..	17	1	1	....	..	1	3	20
Wyoming	1	..	..	....	..	....	..	..	1	..	..	....	..	..	..	1
Total (bituminous)	40	6	9	6	1	3	1	1	67	1	2	1	3	2	9	76
Pennsylvania (anthracite)	8	2	2	....	..	....	..	2	14	..	..	....	1	2	3	17
Total	48	8	11	6	1	3	1	3	81	1	2	1	4	4	12	93

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES *

January-December, 1937 and 1938

Cause	Bituminous: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Anthracite: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Total: Number Killed 1937	1938	Killed per Million Tons 1937	1938
Falls of roof and coal	604	489	1.367	1.428	120	130	2.338	2.885	724	619	1.468	1.598
Haulage	241	152	.545	.444	31	24	.604	.533	272	176	.552	.454
Gas explosions:												
Local	59	24	.134	.070	...	2	.....	.044	59	26	.120	.067
Major	60	60	.136	.175	...	18	.....	.400	60	78	.122	.201
Explosives	29	29	.066	.085	14	13	.273	.289	43	42	.087	.109
Electricity	52	46	.118	.134	4	2	.078	.044	56	48	.114	.124
Machinery	36	21	.081	.061	2	...	.039	.....	38	21	.077	.054
Shaft	15	8	.034	.024	5	3	.097	.067	20	11	.040	.028
Miscellaneous	27	26	.061	.076	14	16	.273	.355	41	42	.083	.109
Stripping or open-cut	7	11	.016	.032	6	10	.117	.222	13	21	.026	.054
Surface	63	34	.143	.099	19	10	.370	.222	82	44	.166	.114
Grand total	1,193	900	2.701	2.628	215	228	4.189	5.061	1,408	1,128	2.855	2.912

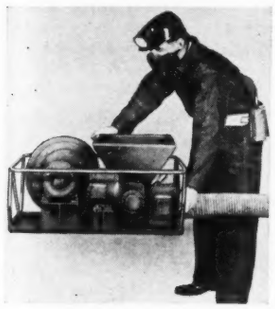
* All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

SAFETY EQUIPMENT

Designed for use in conveyor mines, a new "Portable-Type" rock-dust distributor is announced by the Mine Safety Appliances Co., Pittsburgh, Pa. Outstanding ease of handling by two men is claimed for the new unit, which is constructed so that it may be carried on any conveyor of either the belt or chain type. High efficiency



is another feature noted by the company, which points to economical rock-dusting of conveyor-mine sections which cannot be served by track-mounted machines.

Two new electric hand lamps which are stated to provide greatly increased beam power and unequaled battery life are other new MS-A products. These special hand lamps (Models K and M2) combine the Edison nickel-alkaline battery with a special reflector head, developing in the Model K a beam of 25,000 cp., and in the Model M2, 12,000 cp.

The "Winter Lining" for "Skullgards" is another M-S-A development. This lining is described as a two-piece assembly of heavy close-woven material comprising a standard-sized skull cap and a lined ear-lug section which may be inserted in the hat or cap without alteration or change of size by means of simple snap fasteners. The "Winter Lining" is said to be proof against wind, snow and rain.

M-S-A also offers the new M-S-A "Midget" impinger as the latest development in dust-sampling apparatus employing the accurate impinger method. The unit is light (less than 10 lb.), compact and combines convenient portability with easy manual operation, the company states.

Another M-S-A development is the electrostatic dust and fume sampler, which is designed for quantitative sampling and employs the principle of preionization with electrostatic precipitation. The unit is compact, easy to use and the only sampler, it is stated, that is efficient for metal fumes.

SUPER-DUTY TRUCKS; DIESEL ENGINE

Two new super-duty trucks have been developed by Mack Trucks, Inc., New York City, for open-pit mining, quarrying and similar "off-the-road" operations. Of the two new models, the FC six-wheeler (100,000 lb. gross weight) is stated to have a pay-load capacity of 30 tons. As a four-wheel truck, gross weight is 60,000 lb. and the pay-load rating is 15 tons. The other model (FJ) is designed for a somewhat smaller capacity and is available only with four wheels. Gross-weight rating is 45,000 lb. with a pay-load capacity of 15 tons. The high efficiency of the latter unit, according to the company, makes it particularly suitable for small pits where the grades are steeper or for operations where higher maximum speeds over extended hauls are desirable. All three of the new units are chain-driven and can be obtained with either gasoline or diesel power plants.

The Mack-Lanova diesel engine, adhering basically to the orthodox six-cylinder vertical form and operating on the conventional four-stroke cycle, is offered by Mack Trucks, Inc., Long Island City, N. Y. The Lanova energy-cell combustion system, according to the company, has been selected as offering the highest m.e.p. with the lowest peak pressures, moderate compression and injection pressure and cleanest and smoothest operation. At present the engine is being produced in one size (131 hp. at 2,000 r.p.m.) and is available on the Models BM, BX and CJ trucks.

VALVES

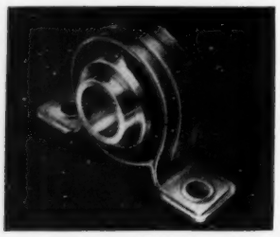
Jenkins Bros., New York City, has developed a line of corrosion-resisting stainless-steel valves in Cooper 18-8 S and 18-8 SMO metals. These two alloys, it is stated by the company, "take care of almost 90 per cent of all corrosion-resisting requirements." The valves are available in seven different bonnet styles in sizes from ¼ to 3 in.

NEW BEARING SEAL; PILLOW BLOCK

A patented triple seal said to protect the bearing effectively against lubricant leakage, dust, dirt and moisture is announced by SKF Industries, Philadelphia, Pa. The seal consists of two piston rings on each side of the housing grooved on the

outside diameter to form a labyrinth seal with the two end bores of the housing. Each ring has an inward tension that enables it to turn with the shaft and, as they are not securely fastened, they are free to locate themselves axially when shaft expansion occurs. A major advantage, the company points out, is that when a bearing is to be stabilized the same housing is used as for the floating bearing. The triple seal is made for the complete range of standard shaft sizes and is designed for machined split housings.

SKF also offers the new "Rubber-Flex" pillow block, comprising a self-locking bearing of the SKF "Grip-Lock" type, described as inherently self-aligning, which is inclosed in a pressed-steel housing provided with a means of lubricating the bearing. Bearing and housing are surrounded by an elastic material said to have special sound-absorbing characteristics and also to be specially treated to make it impervious to oil and grease. Stated to be free from objectionable vibration, the unit



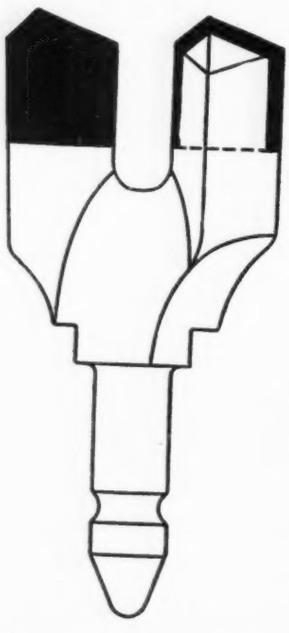
carries substantial loads under practically all operating conditions. Unit construction facilitates mounting. The new pillow blocks are available in ¾- and 1-in. shaft sizes.

COMPRESSOR

A new compressor delivering 425 c.f.m. (actual) at 100 lb. per square inch and bearing the designation Model 425 is announced by the Ingersoll-Rand Co., Phillipsburg, N. J. It is described as a self-contained plant and is available with portable or semi-portable mounting. A four-cylinder heavy-duty tractor-type engine (gasoline, gas or oil) drives the compressor through simple reduction gears. Compactness and light weight are stressed by the maker, along with economy and durability.

COAL BITS

American Cutting Alloys, Inc., New York City, and its representative, John H. Koplowitz, Pittsburgh, Pa., offer a new hard-metal-tipped bit for coal augers. Developed as a result of experience in foreign mining operations, the new bit is stated to have the following advantages as compared to plain steel: much longer life, substantial power savings, less labor, in that one man can handle a drill instead of two or three; smooth operation with consequent reduction in drill and auger vibration, and a substantial reduction in consumption of renewal parts.



EYESHIELD

Lightness, wide range of vision, and ample ventilation are features cited for the new Jackson Type C eyeshield offered by the Jackson Electrode Holder Co., Detroit, Mich., for soldering; flash, gun and spot welding; chipping operations; and general eye protection. The shield consists of a flexible, transparent, non-inflammable visor in a variety of shades adjustably hinged to a light headgear. A smaller similar shield (Type D) fits the face more closely.

TUBING CUTTER

At least five new time- and money-saving features (including new cooling system, precise micrometer stop bar, new type bar holder and clamps for long and short stock, and a new moisture- and dust-proof spindle closure) are claimed for the improved No. 213 Campbell cutting machine offered by the Andrew C. Campbell Division, American Chain & Cable Co., Inc., Bridgeport, Conn. This cutting machine, of the abrasive-wheel type, is stated to be designed for smooth, accurate, high-quality cuts on tubing up to and including 3½ in. and solid bars up to and including 2 in.

SINGLE-PHASE STARTER; LIMIT SWITCH

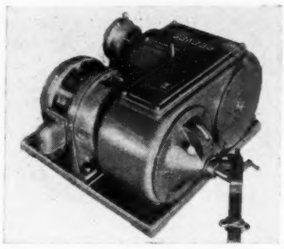
General Electric Co., Schenectady, N. Y., announces a new magnetic starter for single-phase motors. It is available in ratings of 3 hp. at 110 volts, 5 hp. at 220 volts, and 7½ hp. at 440 volts, and consists of a standard general-purpose four-pole magnetic switch with two poles connected in parallel. This arrangement makes the device equivalent to a two-pole switch with one overload relay. Application is limited to motors where the normal full-load current does not exceed 30 amp.

General Electric also offers a new single-pole limit switch (CR9440-E1A) which uses a mercury-button contact mechanism to open and close the circuit. The new device is said to be particularly suitable for use where the force available for the operation of the switch is small. The new switch must be mounted in a vertical position.

Eliminating the need for space-consuming protective coatings in many instances, according to the company, "Formex" wire—a new magnet wire—has been announced by General Electric. The new wire is insulated with a synthetic resin which is stated to be tougher and more flexible than the conventional enamel coatings, in addition to providing as good electrical properties and even higher resistance to abrasion. It may be used, according to the company, in nearly all applications where enameled wire has been used, and withstands even better the operations of winding, assembly and varnish impregnation.

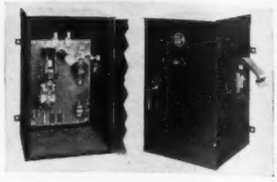
CONTROL

A mechanical automatic control for the Reeves "Motodrive" (a variable-speed control mechanism, motor and gear reducer in one assembly) is announced by the Reeves Pulley Co., Columbus, Ind. Control is exercised by means of a bracket and extended lever on the motor (constant-speed) shaft. From the lever a chain or cable is extended out or the lever may be attached directly to the moving part from which the speed indication is to be taken. Movement of the lever is transmitted to the speed-changing mechanism of the Motodrive. Travel of the lever is limited in either direction by stop screws. Lever length is governed by the application and the lever may be installed in any of four positions. The control is available for all five sizes of Motodrive.

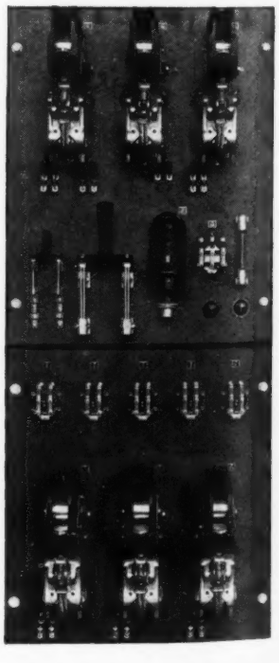


SECTIONALIZER

For the protection of d.c. power circuits, Electric Controller & Mfg. Co., Cleveland, Ohio, announces the new EC&M "Line-Arc" repeating sectionalizer, consisting of a magnetic contactor of the "Line-Arc" design, an overload relay equipped with a ratchet lock-out, and a timing circuit to provide time delay after the overload relay has tripped and opened the contactor. The cabinet is of drip-proof design and can be furnished gasketed, dust-tight, watertight or in other desired form. Mounted on the side of the cabinet is an "on"-and-"off" pushbutton station for closing the magnetic contactor and a button for resetting the ratchet lock-out of the overload relay. In the unit illustrated, a ratchet permits setting it for one to six operations before the contactor is locked open. Provision is made for locking the pushbutton circuit open. The equipment is designed primarily for coal- and ore-mine use for localizing d.c. power interruptions.



For automatically controlling the acceleration of either a.c. or d.c. motors, the company also offers a complete line of starters and controllers employing the new EC&M "Neo-Time" acceleration, which is based on the time required to charge a condenser to a predetermined voltage. When this voltage is reached, the condenser discharges through a neon tube to cause the first acceleration contactor to close. Then the timing circuit is similarly energized for each succeeding step of acceleration. An adjustable resistor in the condenser-charging circuit per-



GET LOWER OPERATING COSTS

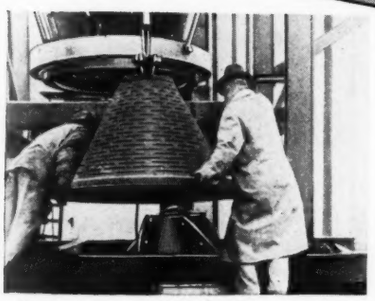
When you

DRY YOUR 1" to 0 WASHED COAL OR RECLAIM THE SLUDGE FROM YOUR WASHERY

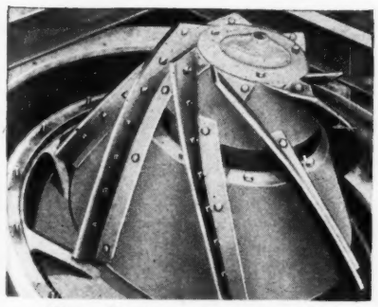
CONTINUOUS CENTRIFUGALS 500 TIMES GRAVITY TRADE MARK

CONTINUOUS CENTRIFUGAL DRYER AND SLUDGE RECLAIMER

1. Requires no more labor to operate than an ordinary electric motor.
2. Operates at a much lower maintenance cost per ton of material processed than any other dryer of similar capacity—AND REQUIRES NO HEAT.
3. Saves large initial investment for equipment and floor space.
4. Deliquefies solid materials at a lower cost than any other known method.



View showing screen basket being superimposed on inner core.



View showing inner cone with flights.

Saving Money in an Indiana and an Illinois Mine.

One of our continuous centrifugal installations in Indiana is now handling up to 100 tons of coal per hour. Authoritative tests show it contains 25% to 30% free moisture as it enters the Centrifugal whereas the coal after processing contains LESS THAN 7% FREE MOISTURE.

Another of our continuous centrifugals installed in Illinois is processing 5/16 inch to 0 coal at the rate of 75 tons per hour. This coal enters the dryer with 25% moisture. Based on an average of 30 tests, our continuous centrifugal removed all but 2 to 3% of the free moisture.

HOW YOU CAN INCREASE YOUR PROFITS

The cost and trouble of disposing of sludge can be entirely eliminated. The sludge can be reclaimed and turned into a salable product at a very low cost. The drying of screenings is accomplished by the same process. Our continuous centrifugal automatically disposes of ash forming materials and reduces the ash and moisture content to a very low percentage. It will dry 1" to 0" washed coal in large tonnage to such a low moisture content that it will not freeze.

We will gladly furnish complete information on request.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

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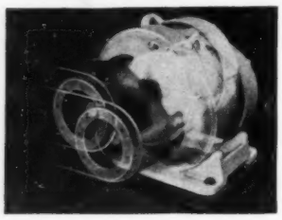
ADVERTISING PAGES REMOVED

mits varying the time. An important application of this type of control equipment, according to the company, is in connection with drives requiring a long time for acceleration.

MOTOR MOUNTING

A new pivot-type motor mounting is offered by the Burke Electric Co., Erie, Pa. All types of Burke motors and generators, both d.c. and a.c., according to the company, now can be pivot-mounted. The



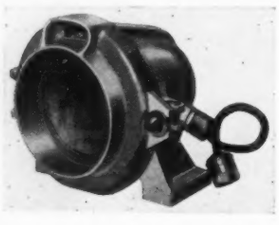
mounting, it is stated, is designed especially for short-center V- or flat-belt drives. The motor weight automatically keeps the proper tension in the belt and compensates for normal belt stretch.

FUEL METER

S. F. Bowser & Co., Inc., Ft. Wayne, Ind., offers the new Bowser "Akraflo" fuel-consumption meter for measuring gasoline consumption by truck units. The new instrument is described as a complete measuring and recording device consisting of an accurate positive-displacement meter and a recording dial. It is designed for installation in a cool location on the truck (not under the hood) and is said to be as easy to hook up as a car heater. A remote-indicating model is available in addition to the direct-reading type.

HEADLIGHT

Mosebach Electric & Supply Co., Pittsburgh, Pa., announces a new mine-locomotive headlight which it states is air-cooled for greater efficiency. Cooling air enters through a vent in the top and circulates over and behind the reflector to a vent in the bottom, the cooling effect thus preserving insulation, wire and sockets. A 94-



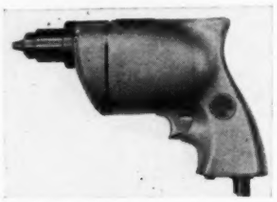
watt bulb is used and the bulb socket is mounted in a spring cradle. The reflector is of silver-plated bronze.

HOIST

Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pa., offers a new line of "Cable King" wire-rope electric hoists featuring air cooling to minimize excessive brake heating resulting from high-speed cable operation. The hoists are offered in various types in capacities of ¼ to 6 tons. In developing the new hoists, a Sirocco blower action was adopted to provide low-pressure air circulation and cooling of the frictional parts of the brake. Fins — simulating a Sirocco blower—are cast in the brake drum in the line of the air stream. As the load is lowered, the fins revolve to produce an air circulation, which is facilitated by vents in the bottom of the housing.

HAND DRILL

Black & Decker Mfg. Co., Towson, Md., announces the "Holgun" heavy-duty hand drill, which it describes as a perfectly proportioned and balanced tool of surprising compactness and smooth, ample



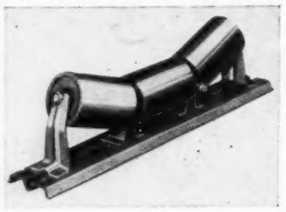
power. Simplicity of construction and assembly are said to provide easy access to any part for inspection and servicing. Capacity in steel is ¼ in. No-load speed is 1,700 r.p.m. Weight is 2¾ lb. Over-all length is 6¾ in. The universal motor operates on either a.c. or d.c.

RUBBER INSULATION

Simplex Wire & Cable Co., Cambridge, Mass., offers a new rubber insulation for wires and cables called "Simplex-ANHYDREX AA-LL." To the 60-percent deproteinized rubber insulation of the company, known as "ANHYDREX AA," has been added, it is stated, the properties of long-life, or super-aging, insulations. The result is described as a combination for the first time in one 60-percent rubber insulation of low water absorption, high electrical qualities, long life and heat resistance. Therefore, the new Simplex-ANHYDREX AA-LL is said to be a heat-resistant insulation suitable for submarine service and a submarine insulation suitable for high temperatures. Longer physical life than any pervious submarine insulation is another claim.

CONVEYOR IDLER

To meet the need for a low-priced troughed anti-friction idler for belt conveyors handling materials of medium weight and consisting of fines and lumps, the Link-Belt Co. has developed the Type 90 ball-bearing idler for 14- to 24-in.-



wide conveyors. Idler rolls are made of 4-in.-diameter smooth-finished steel tubing and the light all-steel construction of the entire unit is said to facilitate handling and erection. The return-roll idler bears the designation Type 91.

INSULATION TESTER; ETCHER

Ideal Commutator Dresser Co., 1013 Park Avenue, Sycamore, Ill., offers a new insulation tester said to be extremely accurate and easy to use. It tests up to 2,500 volts and quickly shows whether there is a short, ground or broken wire. It also is said to be especially suited to testing the insulation of low-voltage equipment. For safety's sake, all current-carrying parts are carefully and fully insulated. The safety features include a three-wire primary cord, spring-operated cover over high-potential secondary test points and a red indicating lamp.

Ideal also offers a new electric etcher for permanently cutting names, sizes, numbers, models and other information on steel, iron, bronze, glass, Bakelite, ceramics, compositions and other materials. It operates at 7,200 strokes per minute and is equipped with a diamond point for marking extra hard materials up to 60 on the Rockwell scale.

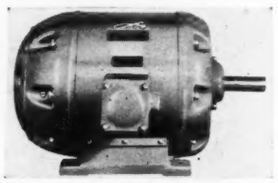
Another low-priced etcher offered by Ideal is designed to mark iron and steel and their alloys, including hardened steels, legibly, easily and economically. The etcher is used in the same manner as a pencil, and the complete unit includes a handpiece and alloy point, transformer with three taps, special primary cord with tap-changing switch, secondary leads of No. 8 wire and a work plate. Weight is 12 lb. Three etching speeds are available. The standard unit operates on 110-volt 60-cycle current, with other units available for different voltages and frequencies.

REGULATOR

Northern Equipment Co., Erie, Pa., offers the new Copes Type SL pump governor for use on steam-driven reciprocal pumps or on centrifugal pumps driven by small steam turbines. It is suited for excess-pressure service in boiler feeding where the maximum excess pressure is not more than 75 lb. per square inch. It also may be used for constant-pressure service where the controlled pressure does not exceed 75 lb. Sizes range from ¾ to 3 in., 250- and 300-lb.-pressure standards only.

EXPLOSION-TESTED MOTORS

Another brand-new line of explosion-tested electric motors in both a.c. and d.c. types is announced by the Louis Allis Co., Milwaukee, Wis., which states that they make possible a new high in dependability, convenience, long life and safety. Designed in collaboration



with one of the leading industrial stylists of the country, the motors are characterized as the last word in modern industrial streamlining. And, according to the company, eighteen separate and distinct major mechanical and electrical improvements are incorporated in this new line.

CONVEYOR

Osborn Mfg. Co., Cleveland, Ohio, has acquired the rights to manufacture and sell the Johns conveyor, which consists essentially of a rubber tube in two halves. The material being conveyed is held within the closed halves of the tube and is moved without dust or spillage, it is stated, as the tube travels over pulleys in the manner of an endless belt. The conveyor, it is asserted, can be shifted from place to place, can be operated in any position and can be installed around corners, up and over obstructions, from a lower to a higher level, etc.